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FINAL REPORT

REGULATORY IMPACT ASSESSMENT

CONSTRUCTION CODE TEAM

FINAL

August 15, 2014

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USAID ECONOMIC PROSPERITY INITIATIVE (EPI)

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TERMINOLOGY

Deadweight loss – the net cost caused to society by a market inefficiency;

Death rate – the ratio of total deaths to total population in a specified community or area over a specified period of time;

Direct fire losses – costs of repairing fire damage, do not include costs such as lost business, housing relocation costs, psychological costs of loss of photographs, antiques, heirlooms, etc. In addition they exclude explosion losses where no fire occurs, e.g. acts of terrorism;

Effectiveness – the degree to which something is successful in producing a desired result. In contrast to efficiency, effectiveness is determined without reference to costs and, whereas efficiency means “doing the thing right," effectiveness means "doing the right thing";

Efficiency – a performance-related concept referring to the amount of inputs necessary to achieve a certain amount of output**;**

Elasticity – elasticity is a measure of the responsiveness of quantity demanded or quantity supplied to the change in one of its determinants. For example, price elasticity of demand is a measure of how much the quantity demanded of a good responds to a change in the price of that good, computed as the percentage change in quantity demanded divided by the percentage change in price;

Externality – The “external” consequence of an economic activity. This consequence is experienced by unrelated third parties. An externality can be either positive or negative;

Gross Domestic Product – The monetary value of all the finished goods and services produced within a country's borders in a specific time period (GDP is usually calculated on an annual basis). It includes all of private and public consumption, government outlays, investments and exports less imports that occur within a defined territory.

Human loss – value of statistical life multiplied by number of people dead;

Information asymmetry – a situation in which one party in a transaction has more or superior information compared to another and can use it to its own advantage. This can lead to situations in which the social optimum cannot be achieved;

Long-run – a period of time long enough to allow firms to adjust the quantity of any factor of production used in the production process. In the long run, firms are able to adjust completely whereas in the short run firms are only able to influence prices through adjustments made to production levels;

MSK – the Medvedev–Sponheuer–Karnik scale is a macro seismic intensity scale used to evaluate the severity of ground shaking on the basis of observed effects in an area of the earthquake occurrence;

Opportunity cost – is the value of the best alternative forgone, in a situation in which a choice needs to be made between several mutually exclusive alternatives given limited resources;

Short-run – In economics, it is the concept that within a certain period of time, in the future, at least one input is fixed while others are variable. The short run is not a definite period of time, but rather varies based on the length of the firm's contracts. For example, a firm may have entered into lease contracts which fix the amount of rent over the next month, year or several years. Or the firm may have wage contracts with certain workers which cannot be changed until the contract renewal;

Third party control – Evaluation of project / thing / building etc. by professionals who have not been involved in the realization. The third party control ends with a report on the performed work;

Value of statistical life – is a monetary value assigned to human life through quantitative analysis of existing data.

ACRONYMS & ABBREVIATIONS

CBA	Cost-Benefit Analysis
EPI	Economic Prosperity Initiative
GeoStat	National Statistics Office of Georgia
GDP	Gross Domestic Product
GEL	Georgian Lari
GTU	Georgian Technical University
ISET	International School of Economics at Tbilisi State University
MoES	Ministry of Education and Sciences of Georgia
MoESD	Ministry of Economy and Sustainable Development of Georgia
MoF	Ministry of Finance
MSK	Medvedev–Sponheuer–Karnik scale
NAEC	National Assessment and Examination Center
NPV	Net Present Value
RIA	Regulatory Impact Assessment
SMEs	Small and Medium Enterprises
VAT	Value Added Tax
VSL	Value of Statistical Life
WDI	World Development Indicators

I. EXECUTIVE SUMMARY

The Georgian Government is currently drafting a new Code on Spatial Planning and Construction, with the aim of increasing the safety of new constructions while consolidating the great achievements obtained in terms of effectiveness in the delivery of construction permits. One of the main changes that is likely to be introduced in the new Code – in line with the best practices at the international level[1] – is the regulation of the qualification requirements for building designers. The current government believes that the time has come to increase the safety standards and to regulate access to the profession of building designer.

A large number of actors are likely to be affected by such a reform. Among them: the Ministry of Economy and Sustainable Development of Georgia (MoESD) and other governmental agencies (who will be involved in its implementation and enforcement), building designers, customers, construction companies, academic professionals, and students. While conducting this study we have consulted all of these categories of stakeholders. For consultations, a set of common questions for each category of stakeholders was developed and official consultations / interviews /online surveys were organized. The consultation process started on the 5th of May 2014 and ended on the 14th of June 2014.

The consultations conducted confirmed that the Georgian construction sector is currently characterized by an extremely high level of asymmetric information between designers (who know well the real characteristics of the products they design) and buyers, owners and users (who do not). The existence of asymmetric information in the market for building designers leads to inefficient equilibria both in the market for building designers and in the construction market, with customers paying more than they would if they were fully informed about the true quality of the services/products they are acquiring. In addition, this information asymmetry facilitates the emergence of negative externalities due to bad design and – if not addressed – increases the risk of the society to incur extremely high monetary and non-monetary losses in the future due to:

- lower than desirable level of building safety;
- increased uncertainty in the market for professional building designers and in the construction / real estate markets;
- lower visibility of the Georgian professional building designers and of Georgian construction companies in the international markets.

In such a scenario, non-qualified building designers are gaining at the expense of qualified professionals, consumers and, more generally, the society at large.

[1] In all systems reviewed by the World Bank practitioners play a key role. The implementation of the most modern form of risk-based management places a great emphasis on shifting “the risk, responsibility, and liability back to the design sector” in order to eliminate the potential bottlenecks due to the limited supervisory capacity of local authorities. Given the public interests at stake it becomes even more important that designers’ qualifications are thoroughly tested before they are allowed to operate. For more on the issue see Annex E.

Overall, the trends identified in our analysis suggest that – in absence of any intervention - the massive inflow of potentially underqualified practitioners that is taking place in the market could cause (and might even have already caused) substantial monetary and non-monetary losses. Obviously, given the high level of uncertainty and the impossibility to quantify exactly all the impacts, the exact long-run impact on society will be measurable only in the future. It is clear, however, that waiting to address this issue will only make the negative impacts larger and more pervasive.

The relevance of this argument is confirmed by the fact that all stakeholders interviewed – including members and representatives of the Architects' Union – have warmly welcomed the idea of the Government introducing a compulsory national certification for building designers and confirmed its importance in order to increase the qualitative standards within the sector and to minimize future losses associated to faulty building designs.

The presence of asymmetric information and of negative externalities are two of the main rationales that can justify government intervention. In situations like the one under analysis the market failures are such that it is impossible to achieve a social optimum without any external intervention. In the current framework it is extremely difficult and costly for market participants to eliminate the information asymmetry. This is even more worrysome as those who hire building designers do not internalize fully the costs associated with a bad design. In this specific case, therefore, the main objective of the policy actions is not only to eliminate the existing information asymmetry between building designers and the other market participants, but also to ensure that a minimum qualitative standard to operate in the market as building designer is established. In this way, not only the deadweight loss in the building designers' market, but also the negative externalities in the construction market (due to bad design) are eliminated.

In this work we have been considering and analyzing three options:

- a baseline scenario (status quo) where no action is taken;
- two options in which a certification for building designers is introduced:
    - one in which the certification process is entirely managed by professional associations;
    - one in which the certification process is managed jointly by professional associations and government officials.

The evaluation criteria we applied in order to rank the options were both quantitative (we compared the NPV of Options 2 and 3 to those of Option 1) and qualitative (when we were unable to obtain monetary values for some benefit and cost items, we compared the theoretical predictions about the impacts of the different options on them).

The main results of our analysis are summarized in Table 1 below. Both quantitative and qualitative analysis generated the same ranking, with Option 3 (joint management of the certification process by professional associations and government officials) being preferred both to Option 2 (certification process managed by professional association) and to the status quo.

Option 3 was found to generate the highest NPV of net benefits. It also turned out to be the most effective way to achieve the desired objectives, to minimize the risks associated with

the reform and to maximize the collateral benefits associated with the reform while being relatively easy to implement.

Table 1.

EVALUATION CRITERIA	OPTION 1	OPTION 2	OPTION 3
Benefits – costs (NPV)	-	49,036,842 GEL	53,869,679 GEL
Effectiveness	- - -	++	+++
Feasibility / Ease to comply	+++	++	++
Minimization of risks associated with the reform	-	-	++
Maximization of collateral benefits associated with the reform	- - -	++	+++
SUMMARY	**- -**	**++**	**+++**

For this reason, the final recommendation of this Pilot RIA is to introduce a certification system for building designers, jointly managed by members of professional associations and by government officials.

II. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

A. ORGANISATION AND TIMING

The Regulatory Impact Assessment (RIA) of the proposed introduction of a National Certification for building designers was performed in the period between the 7th of April, 2014 and June 27th, 2014.

The RIA process started with a few preliminary meetings, including one (on the 15th of April) with the external experts supporting the team during this pilot RIA, aimed at:

- defining the general objective of RIA
- developing a research strategy and a research agenda
- agreeing on the main deadlines and milestones.

The RIA action plan – a second milestone – was delivered on the 22nd of April, followed by the definition of a common template for the Final Report, finalized on the 6th of May.

The period from the 22nd of April to 19th of May 2014 was spent:

- discussing the procedural issues
- organizing and conducting interviews of relevant stakeholders
- collecting data, necessary for the analysis
- performing preliminary analysis and preparing the mid-term report.

After the finalization of the mid-term report, on the 23rd of May, all the efforts until the 27th of June were focused on data analysis which was finalized with the selection of the best option among the ones identified in the previous phases.

The team met several other times in order to discuss details (such as the duration of the transition period and the characteristics of the exam) that potentially affected costs and benefits; and to achieve a common understanding of the emerging issues.

The draft version of the final report was produced on the 27th of June and the final version was finalized on the 13th of July.

The RIA team included representatives from the Ministry of Economy and Sustainable Development of Georgia (MoESD), researchers from the ISET Policy Institute and a representative from USAID Economic Prosperity Initiative (EPI). The tasks were divided amongst the team members in accordance with their expertise and the role. Nearly all of the team members were involved and contributed to each step of RIA. In addition, the team

benefited from the external experts hired by EPI, in particular Ewelina Uljanicka, who closely followed each phase of the pilot giving frequent and valuable feedback.

The decision making approach adopted by the team was collegial and coordinated by the team leader and by the external expert.

B. CONSULTATION AND EXPERTISE

Consultations with various stakeholders and data collection were held over the period April 21, 2014 – June 14, 2014. Main stakeholders were identified and categorized in the influence- interest matrix format.

Table 2. Influence-Interest Matrix

INFLUENCE / INTEREST	LOW INFLUENCE	HIGH INFLUENCE
Low Interest	Academic Professionals	NAEC
	Tbilisi City Hall, the City Supervision Service	
High Interest	Architects	Construction companies
	Fire Department	
	Engineers	Georgian Architect's Union
	Students	
	Non-professionals operating in the sector	
	Training centers in the field	
	Auditor companies	

In order to develop a comprehensive overview of the current state and the possible solutions to the problems identified, the use of a multiplicity of methods were opted for, among them: desk research, request of official data, telephone interviews, online surveys, in-depth interviews of the identified stakeholders (both formal and informal).

Consultations and data gathering were split into two main phases.

The goal of the first phase of the consultation and data gathering was to define the problem, objective(s) of the policy and identify possible policy options. As for the second, complementary phase of consultations and data gathering, it had the main purpose of helping the team gather the missing information / data necessary to compare the different policy alternatives to the status quo and select the best one.

The first official meeting took place in the MoESD with the Head of Spatial Planning and Construction Policy Department; Mr. David Gigineishvili. During the meeting, Mr. Gigineishvili introduced the main changes to the legislation related to construction sector and spatial planning that were being discussed. Due to both the complexity of the draft law on spatial planning and construction and the time constraints, RIA team and Mr. Gigineishvili agreed that RIA should have focus on a single – but crucial – aspect of the reform: the introduction of a national certification exam for professional building designers.

As a result, of the two consecutive phases of data gathering, the following data and information were collected.

Table 3. Data and information collected during two phases

DATA AND INFORMATION	METHODS USED / SOURCE
Legal setting and historical changes in legal setting	Desk research
Fire accidents in Georgia recorded during the last three years	Requesting information officially from the emergency response center 112
Court cases related to construction in Georgia (last 8 years)	Requesting information officially from the supreme court of Georgia. The information was collected for the common courts only
Tbilisi City Hall data about quality checks (last 2 years)	Requesting information officially from the Tbilisi City Hall, City Supervision Service
Data about the number of bachelor graduates in Georgia (last 6 years)	National Statistics Office of Georgia (GeoStat)
Data about the amount of square meters permitted to be built (last 4 years)	Requesting officially from the MoESD
Georgian Household Data	GeoStat

DATA AND INFORMATION	METHODS USED / SOURCE
Economic data about Georgia	Desk research / GeoStat and World Bank Development Indicators (WDI)
Seismic Intensity in Georgia	Meeting with scientists from M. Nodia Institute of Geophysics of Georgian Academy of Science, complemented with desk research
International fire statistics	Desk research / Geneva Association
Value of statistical life (VSL)	Desk research / Multiple sources[2]
Georgian fire statistics	Desk research / GeoStat
State budget data about common court expenditures	Desk research / Ministry of Finance (MoF)

For consultations, a set of common questions for each category of stakeholders was developed and official consultations and interviews were organized with the Georgian Union Architects, businesses operating in the construction sector, architects and engineers, audit companies, representatives of the Fire Department, academic professionals, and students of architecture and civil engineering at Georgian Technical University (GTU).

In order to attain a better understanding of the challenges associated with setup of a national certification system it was decided to consult and interview the representatives of other regulated professions and their regulators. Emphasis was placed on cases of teachers and lawyers because they are both regulated at the national level and differ in their regulation procedures.

Teachers are regulated directly by the state and tested by the National Assessment and Examination Center (NAEC) which is also in charge of certification procedures. Lawyers' certification instead was firstly managed by the state and then transferred to the professional association. Several interviews were conducted with certified teachers, lawyers, NAEC and other legal associations in order to assess their attitude toward certification itself and perceived benefits and results.

[2] Doucouliagos H., Stanley T.D., Viscusic W.K. (2014). "Publication selection and the income elasticity of the value of a statistical life". *Journal of Health Economics*, 33, pp. 67– 75; Giergiczny, M. (2008), "Value of statistical life – the Case of Poland", *Environmental and Resource Economics*, 41:pp. 209-221. DOI: 10.1007/s10640-007-9188-2; Boardman, A. E., Greenberg D.H., Vining A. R., and Weimer D.L. (2006). C*ost-Benefit Analysis: Concepts and Practice*. 3rd ed., (Upper Saddle River, NJ: Pearson Prentice Hall).

A summary of the consultation process and in-depth informal, as well as formal interviews are briefly described in the following table.

Table 4. Summary of Consultation Process

STAKEHOLDER / STAKEHOLDER GROUP	METHOD OF CONSULTATION	SUMMARY OF RESPONSES	COMMENT
Dean of the Faculty of Construction, GTU	Interview carried out on May 5, 2014	According to the Dean, the graduates cannot work as independent workers right after completion of BA and this is not the goal of the curriculum either. According to him, BA graduates of his faculty are ready to work only with supervisors and it is MA and PhD together with the practical experience that lets the person work independently. The Dean is for certification and thinks that it will improve the situation. As for the exam, the Dean thinks that exam materials should be written by university professionals and the exam should be computerized in order to prevent corruption.	Response taken into consideration
Dean of the Faculty of Architecture, GTU	Interview carried out on May 6, 2014	The Dean thinks that there is safety problem in construction sector. He is also in favor of certification and thinks that one has to have some practical knowledge and experience in order to prove above theoretical knowledge. He claims that GTU graduates do not have any particular problems while applying for western universities.	Response taken into consideration
Companies operating in construction sector	Interviews carried out on May 7, 2014	The main finding of the interviews was that there is a safety issue in the construction sector currently and the main cause of it is that	Response taken into consideration

STAKEHOLDER / STAKEHOLDER GROUP	METHOD OF CONSULTATION	SUMMARY OF RESPONSES	COMMENT
		architects do not quite care about safety. The interviewees are satisfied about the fact that government is going to initiate national-wide certification of architects and engineers. They think this will help architects to improve their qualification and significantly increase the safety in construction.	
Construction engineer	Interview carried out on May 8, 2014	According to the interviewed constructor, there are several safety problems currently in the sector and there will always be, because it is not possible to build 100% safely. He thinks that recently constructed buildings are much safer than the old buildings. The reason for this would be that the system is now less corrupt and both customers and contractors are trying to monitor constructors and builders. Despite this, he is very much in favor of certification, which could help increase safety, though he does not believe that certification will solve the problem fully.	Response taken into consideration
Certified lawyers	Interview carried out on May 13, 2014	Certified Lawyers are not satisfied with certification. They think that it did not help them become better professionals. As they claim, certification in their profession is just a document that allows them to work in supreme and appeal courts. They also think that the certification is not a good way to check the preparation of a professional. For example, a recent graduate who remembers	Response taken into consideration

STAKEHOLDER / STAKEHOLDER GROUP	METHOD OF CONSULTATION	SUMMARY OF RESPONSES	COMMENT
		laws and articles by heart can easily pass the exam while a really qualified and experienced lawyer who may not remember the exact text of some specific article may fail. The exam for certification is multi-type. There are tests as well as open questions and specific cases.	
Architect	Interview carried out on May 14, 2014	According to the interviewed architect there is a safety problem currently in construction sector. The main problems regarding architecture is related to fire and ventilation systems as architects do not have any national standards to follow. He thinks that developing national standards in architecture is really crucial and should be provided by the government. The architect is also the supporter of the certification and thinks that it will filter unqualified architects from the businesses, as well as raise the salary for the ones who are really qualified.	Response taken into consideration
Georgian Bar Association (Lawyers' Association)	Interview carried out on May 14, 2014	According to the interviewee the price for the exam they administer is 160 GEL per person. They also offer training courses before the exam in 3 areas: general training, which includes civil and criminal laws, training in civil law and training in criminal law. The fee for the general training is 550 GEL, while for separate courses in civil and criminal law, each costs 450 GEL. The duration of	Response taken into consideration

STAKEHOLDER / STAKEHOLDER GROUP	METHOD OF CONSULTATION	SUMMARY OF RESPONSES	COMMENT
		the courses is 2 months. The exam includes computer-based tests. The test bank is not provided to the applicants in advance, but list of all topics for the exam is known (list of legislation acts covered). The exam material is accepted and approved by the education board of the association and is based on current legislation. Approximately 20-40% of tests are changed during each exam round.	
Audit company	Interview carried out on May 15, 2014	According to the audit company, customers do not care about safety. When they hire auditors to evaluate their property they do not pay attention to safety and the sustainability of the building.	Response taken into consideration
Fire department	Interview carried out on May 27, 2014	According to the representative of the fire department currently fire safety is not properly included in the design of buildings, increasing substantially the risk of accidents and the extent of material as well as human losses when accidents do happen. The introduction of a well-designed certification system is expected to reduce both the risk of accidents and the extent of the losses.	Response taken into consideration
Students of GTU	Online questionnaire – results on June 14, 2014	According to the vast majority of the students who replied, certification of architects and civil engineers is necessary and advantageous for them and for safety, as well. According to them their curriculum is actually lacking sufficient emphasis on safety	Response taken into consideration

STAKEHOLDER / STAKEHOLDER GROUP	METHOD OF CONSULTATION	SUMMARY OF RESPONSES	COMMENT
		issues and existing regulations / standards. All students agree that a new graduate is not able to work independently to design safe buildings and needs at least two years of (supervised) practice in order to acquire such ability. As for the quality of newly constructed buildings, all of them answered that newly built buildings are not safe.	

III. PROBLEM DEFINITION

A. POLICY CONTEXT

The Georgian Government is currently drafting a new Code on Spatial Planning and Construction, with the aim of increasing the safety of new constructions while consolidating the great achievements obtained in terms of effectiveness in the delivery of construction permits (Georgia currently ranks 2nd in the world in this area – behind Hong Kong SAR, China and above Singapore – according to The International Bank for Reconstruction and Development, The World Bank, 2013). One of the main changes that is likely to be introduced in the new Code – in line with the best practices at the international level[3] – is the regulation of the qualification requirements for building designers. The current regulation has no official qualification requirement for building designers. Moreover, public authorities are not expected to perform any checks about the safety of the design submitted. Documents proving that the safety of the building design has been checked by third party experts have currently to be submitted only for the high-risk buildings (class V) that are under the direct supervision of the state authorities who select the third party expert on the case by case basis. This state of things is the result of a conscious choice by the previous government to let the construction market develop and strengthen before introducing more binding safety standards. The current government believes that now the time has come to increase the safety standards and to regulate the access to the profession of building designer. The purpose of this work is to assess the potential impacts of the different alternatives under consideration.

B. PROBLEM DEFINITION

The construction sector is characterized by an extremely high level of asymmetric information between designers and constructors (who know well the real characteristics of the products they design/build) and buyers, owners and users (who do not). The existence of asymmetric information in the market for building designers leads to inefficient equilibria both in the market for building designers and in the construction market. In addition, it facilitates the emergence of negative externalities during the design and construction processes and – if not addressed – increases the risk of the society to incur extremely high monetary and non-monetary losses in the future.

The absence of a reliable way to test and certify the qualification of building designers is contributing in several ways to:

- inadequate levels of building safety;

[3] In all systems reviewed by the World Bank practitioners play a key role. The implementation of the most modern form of risk-based management places a great emphasis on shifting “the risk, responsibility, and liability back to the design sector” in order to eliminate the potential bottlenecks due to the limited supervisory capacity of local authorities. Given the public interests at stake it becomes even more important that designers’ qualifications are thoroughly tested before they are allowed to operate. For more on the issue see Annex E.

- increased uncertainty in the market for professional building designers and in the construction / real estate markets;

- lower visibility of the Georgian professional building designers and of Georgian construction companies in the international markets.

Failure to address this problem can, therefore, increase the risk for the Georgian society to incur significant economic and human losses.

Effects on Building Safety

A good building design is the first step to ensure that a building is safe. To design a safe building it is necessary that the professional designer possesses solid theoretical and practical knowledge and that s/he continues updating it as time passes, new technical solutions emerge and new safety regulations are introduced. It is also necessary that the professional has the right incentives to operate at the best of his/her capabilities.

In the absence of a reliable system testing and certifying that professional designers possess the required knowledge and experience, it can be extremely costly for their customers to verify whether they possess them or not. More generally, it becomes extremely difficult and costly to verify who is a true expert in building design. This means that:

1. Some professional designers can work even if they lack sufficient knowledge and experience to design safe buildings. In some cases the professionals themselves might not be aware of their limitations (lack of training / out-of-date notions, etc.).

2. Consumers can find it extremely hard and costly to check (directly or through "qualified third parties") the safety of the design and to distinguish between a safe project, designed by a qualified professional, and an unsafe one. In such situation the risk that unsafe buildings are designed and realized increases, as the willingness of consumers to pay for safer buildings (where claims of higher safety cannot be easily tested) decreases, making it more difficult to sell them.

3. Professionals possessing adequate knowledge and experience might find themselves competing against cheaper non-qualified competitors and having to lower the safety standards of their projects in order not to be forced out of the market. The impossibility for professionals to signal their superior preparation to their potential customers – and the greater safety of the buildings designed by them – will reduce their incentive to engage in the continuous training that is required to ensure that they remain up-to-date with respect to the best practices in the profession and the most recent safety regulations.

4. Finally, if consumers – in the absence of adequate information – are not willing to pay more for safer buildings, also construction companies who do both the design and the construction might have to lower the safety standards of the buildings they construct (reducing the time spent to design the building and quality of the construction materials employed in the construction process) in order not to be forced out of the market.

The resulting (insufficient) safety level of the building stock has the effect of increasing the expected human and economic losses associated, among others, with earthquakes, fires and other calamities.

Increased uncertainty in the market for professional building designers and in construction / real estate markets

The absence of a reliable system testing and certifying that professional building designers possess the required qualifications, not only increases the uncertainty in this market and in the related construction and real estate markets; it also makes it more difficult for economic agents to insure against them.

In Georgia, it is currently possible for owners to ensure their real estate properties. However, the insurance market for professional building designers is not yet developed. Consultations with representatives of professional associations have revealed that one of the main obstacles for the development of such market is exactly the absence of a reliable system testing and certifying that professional building designers possess the required qualifications.

The absence of insurance coverage increases investors' uncertainty about whether legal liabilities will be honored or not, potentially causing a reduction of their willingness to pay for real estate properties. It also deprives the construction market of the additional safety checks that insurance companies perform in more developed countries. In this way, the imperfections in the building designers' market can end up hampering the development of the construction market as a whole.

International visibility of Georgian professionals and construction companies

A reliable system testing and certifying that professional building designers possess the required qualifications is even more important for the Georgian professionals and construction companies that want to participate in international competitions to increase their international visibility.

The absence of such certification system is what has prompted the initiative from the Georgian Union of Architects to introduce a self-certification. In the absence of such self-certification, which does not require passing any test nor any examination, Georgian architects would not have been allowed to take part in international competitions.

The relevance of this argument is confirmed by the fact that all stakeholders interviewed – including members and representatives of the Architects' Union – have warmly welcomed the idea of the Government introducing a compulsory national certification for building designers and confirmed its importance in order to increase the qualitative standards within the sector.

The analysis of the three main aspects of the above mentioned problem has shown how the absence of a national certification for building designers affects negatively a large number of actors:

- Qualified professionals operating in the construction sector. Using GeoStat Integrated Household Survey data we were able to estimate the number of individuals performing the functions of architects and civil engineers in the construction sectors in Georgia. The numbers estimated ranged between about 8400 in 2009 and about 9700 in 2012. The majority of these individuals were indeed architects and / or civil engineers, but a substantial (and increasing) fraction was not. According to GeoStat data, while in 2009 the fraction of non-architect / non-civil

engineers was below 5%, in 2012 this fraction raised to almost 30%. At the same time, the average compensation of individuals performing the functions of architects and civil engineers – as it appears from the household survey – is lower than in most other countries, both in relative and absolute terms, and has remained almost stable in real terms in the last four years according to the same data.

- Construction companies — according to GeoStat (in March 2014), 3437 construction companies were active. These businesses could lose part of their potential profits if the negative perception about the average (and uncertain) quality of newly built buildings spread. This, in turn, could slow down the development of the real estate market. The situation is even worse for those companies delivering higher quality buildings, facing unfair competition by other (lower-quality) companies. During our consultations we have encountered evidence of buildings unsold because, while better designed, they were more expensive.

- Owners / users of buildings. According to the data by MoESD, in the last 4 years construction permits total 23,455,840 square meters have been issued (of which, more than 8 million square meters from the past year alone). Given the average amount of living surface available – per person – in Georgia (about 22 square meters according to GeoStat Household Survey data), this means that in the coming years about one million Georgians might be living or working in newly built (or recently renovated) buildings. Even if the trend slowed down and stabilized, this could still imply a yearly flow of some hundreds of thousands individuals. These individuals are those that would face the most serious consequences in case the new / renovated building turned out to be unsafe. Costs for them could range from the loss of part (or all) of the capital invested to injuries or even death. These costs, as it turned out, can be substantial. We will discuss them (in particular costs related to fire accidents and earthquakes) in greater detail in the following sections.

- Public administration — insofar as the existence of asymmetric information and negative externalities hampers the development of the construction sector and risks causing harmful consequences to the society, it also negatively impacts the public budget (lower revenues and higher costs).

C. BASELINE SCENARIO

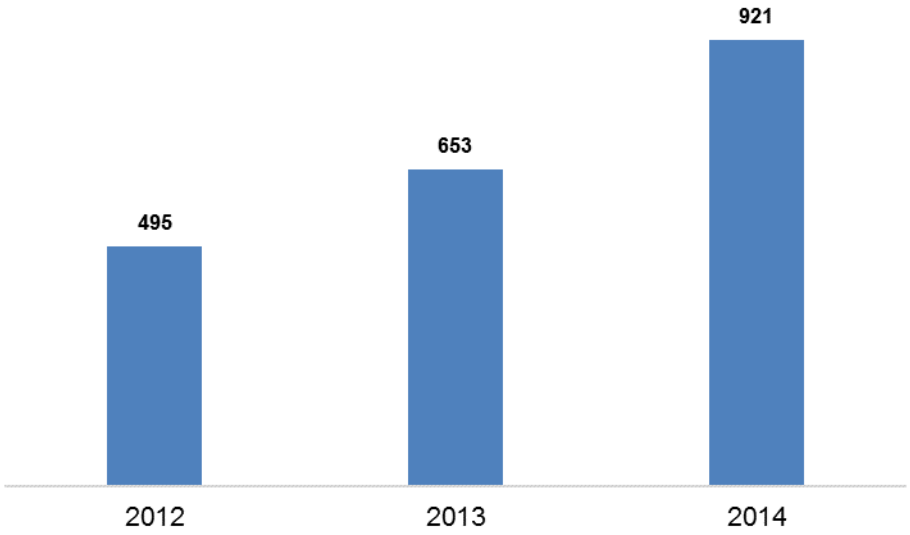
The baseline scenario is defined as a policy option in which nothing changes in the existing legislation and current trends in population growth, economic performance, construction sector growth and evolution of market for professional building designers are assumed to continue unchanged. Our expectation is that in the baseline scenario the problems highlighted above would be magnified.

Of particular interest under the baseline option is the safety of newly constructed buildings that, according to the current trends, can be expected to deteriorate in the future. This is suggested by the analysis of the few available data, in particular:

- number of fire calls;
- number of court trials relative to construction issues;
- number of requests to check the buildings in Tbilisi (and costs);
- number of square meters of new constructions which were authorized;
- number of square meters designed by one architect per year;

- number of graduates from higher education institutions in architecture and construction engineering.

Figure 1. Average Monthly Fire calls registered by 112 in Georgia



Source: Ministry of Internal Affairs, 112

Figure 1 above shows the number of fire calls for 2012, 2013 and 2014. In this three year period, the average number of monthly calls to 112 for fire accidents almost doubled. Although the cause of the fire is not provided by 112, this trend could be a general indicator that there are some (increasing) problems due to poor design. This expectation is reinforced by our interviews with architects and with a Fire Department representative. According to the respondents, one of the main weaknesses of Georgian architects is the lack of information about new techniques and technologies, for example, in designing fire and ventilation systems.

GeoStat collected data on the damages (direct fire losses) and number of fires for 2003-2008[4]. The number of fires has increasing trend, while damages significantly vary from year to year with maximum number of 1,117 GEL per fire case in 2003, and more than three times lower in 2006 – 368 GEL.

[4]Obviously not all registered fires are due to bad design. However, bad design can considerably increase the risk of fires and the cost of fires, both in economic and human terms, as mentioned by the representative of the fire department we interviewed. Currently, according to our source, buildings are rarely designed having in mind fire safety concerns. As a result, in case of fire consequences are expected to be substantially more serious than would otherwise be.

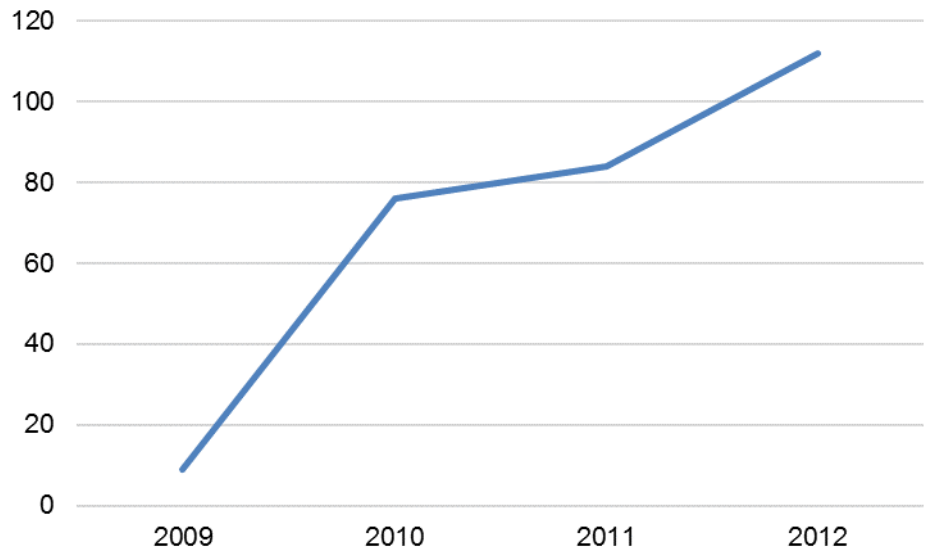
Table 5. Registered Fires

	2003	2004	2005	2006	2007	2008
Number of registered fires during the year	4,418	5,086	4,818	7,882	6,488	7,984
Damage, mln GEL	5.2	6.9	3.8	2.9	4.7	5.9
Damage per registered fire, GEL	1,177	1,357	789	368	724	739

Source: National Statistics Office of Georgia (GeoStat)

Another general indicator of the trend characterizing the construction sector is the number of court cases related to construction issues over the last years (Figure 2). While in 2009, there were only 9 cases, by 2012, the number of cases had increased to 112 (1200% increase). Although the deterioration of the quality of building designs is not the only possible explanation of this trend and many other things happening in the country - like the people's attitude and confidence in jurisdiction - could affect this number, these data suggests that in the absence of action the number of court cases might continue increasing further.

Figure 2. Number of court cases relative to construction issues



Source: Supreme Court of Georgia

Another interesting trend can be observed when examining the data about requests to Municipal authorities to check for mismatches between design and realization that could affect safety negatively. We managed to collect data from Tbilisi City Hall for the years 2012 and 2013. While small in absolute terms, the demand for checks has more than doubled from 2012 to 2013, growing for all risk classes. Tbilisi City Hall reports that in all the cases requests were well-grounded and mismatches were found.

Table 6. Number of requests directed at Tbilisi City Hall to check buildings, 2012-2013

YEARS / RISK CLASS	II	III	IV	TOTAL
2012	1	14	7	22
2013	5	20	27	52
Total	6	34	34	74

Source: Tbilisi City Hall Legal Service

The safety of a building design might be affected also by the time spent by the professional working on it. To assess this aspect, we used the available data to estimate the trend characterizing the number of square meters designed by an average Georgian building designer in every year. From the National Household Survey 2010-2012 we estimated the number of building designers in Georgia. Our estimates indicate an upward trend: from 6,700 in 2010 to 9,800 in 2012. Table 7 below shows the total number of square meters that was authorized in Georgia from 2010 to 2012.

This number steadily increased from 2,800,199 in 2010 to 6,598,229 square meters in 2012. Based on the number of building designers and the number of square meters authorized in the period 2010-2012, we calculated the number of square meters designed on average by each building designer. This calculation is shown in Table 7.

Table 7. Square meters designed by one Georgian building designer on average

	2010	2011	2012
Square meters authorized per year (Georgia)	2,800,199	5,682,595	6,598,229
Number of building designers on the market	6,700	7,200	9,800
of which Architects and Civil Engineers by profession	5,900	6,200	6,950
Square meters designed building designer	431	812	713
Average number of square meters that can be designed in a year according to international practices (based on square meters/day, internet survey)[5]			
Minimum number of square meters per year	495		
Average number of square meters per year	702		
Maximum number of hours	1,713		

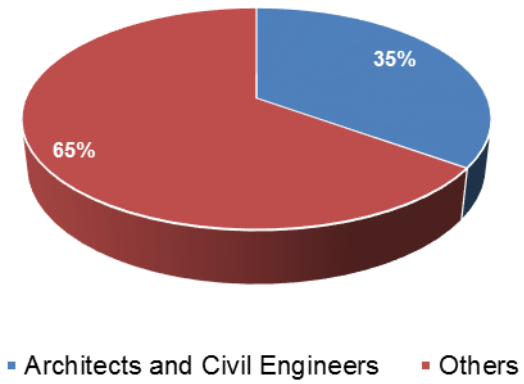
Sources: GeoStat, Ministry of Economy and Sustainable Development, internet survey; authors' calculations

[5] To obtain the numbers below we collected data about the number of hours required on average to design a given number of square meters. We estimated then the total amount of square meters corresponding to 12 months of work, 4 weeks per month, 5 days per week, 8 hours per day to obtain the expected number of square meters designed in a year. To have an idea of the possible variation we looked at the most and the least "time consuming" activities. Sources consulted: http://www.gsarchitects.net/Articles/Article%20Pages/01-design-proc.htm ; http://swinburnearchitect.com/wordpress/?p=1032;

On average, a Georgian building designer signed projects for 431 square meters in 2010, 812 — in 2011 and 713 — in 2012. Looking at the results of our limited internet research - reported in the bottom part of Table 7 - we cannot say that the daily workload of Georgian building designers has become a cause for concern (in 2011, the year when on average the number of square meters designed by Georgian building designers was the highest, each building designer designed well within the range obtained looking at the international practice).

On the other hand, if we combine these data with the analysis of the trends in the labor market for building designers the picture is definitely less optimistic. As a matter of fact, the individual workload of the Georgian building designers remained reasonable only thanks to the significant increase in the number of designers (46% increase) operating in the market. However, the majority of these "new entrants" (almost two thirds of them according to GeoStat Household Survey) were neither architects nor civil engineers (Figure 3).

Figure 3. Newly Hired Building Designers by Education, 2010-2012

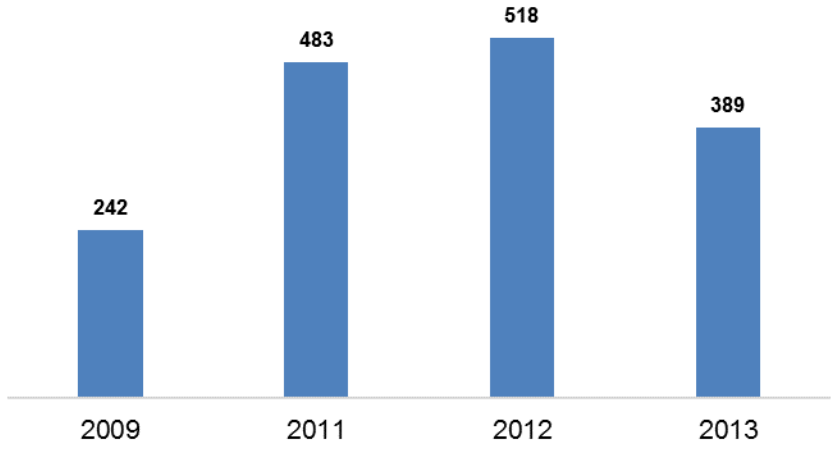


Source: GeoStat (Authors' calculation)

This is understandable, due to the fact that the number of graduates in architecture and civil engineering in those year was not sufficient to satisfy market demand for building designers. Nor does this trend seem to be about to change significantly. On the contrary, the number of graduates in 2013 was the lowest since 2009 (Figure 4).

This is not surprising in a system in which, on one hand, there is no specific professional requirement to become a building designer and, on the other hand, the remuneration of such profession remains stable at a relatively low level even in periods of booming demand for building designers. Obviously, given this state of things, the incentive to invest in specialized higher education (and / or in self-education) is quite low. This is a very important consideration to make when evaluating the potential impacts on safety with and without a reform.

Figure 4. Number of Graduates from Higher Education Institutions in Architecture and Construction Engineering[6]



Source: GeoStat

Overall, the trends identified suggest the existence of a very dynamic market for building designers, pushed by the large increase in the activity of the construction sector in the last years. Both newly hired graduates and individuals with a very "unconventional" educational background seem to have entered massively the market to close the gap between demand and supply. While this might have helped the growth of the construction sector in the short run, available data suggests that this massive inflow of potentially underqualified practitioners in the market could be already causing a substantial reduction in the safety of the newly constructed buildings. The true impact on society of the current of this state of things will become more evident only in the long run.

These concerns were shared by all the stakeholders we consulted. The potential consequences of inaction are analyzed in the following sections, together with the potential consequences of the introduction of a certification system for building designers.

[6] Unfortunately GeoStat data for year 2010 are missing.

IV. OBJECTIVES

A. GENERAL OBJECTIVES

The general objectives of the government's intervention are:

1. Increasing safety of newly built buildings
2. Reducing the uncertainty in the market for professional building designers and in the construction / real estate markets
3. Increasing the international visibility of Georgian professionals and business companies operating in the construction sector

B. SPECIFIC AND OPERATIONAL OBJECTIVES

A number of specific and operational objectives could be associated with the general objectives listed above. We have identified the following:

1. Increasing safety of newly constructed buildings:

    a. All new authorized buildings designed by professionals with a satisfactory knowledge of safety-related best practices and regulation;
    b. All building designers having a satisfactory knowledge of safety-related best practices and regulation;
    c. Increasing the number of qualified professionals capable of performing third-party controls.

2. Reducing the uncertainty in the market for professional building designers and in the construction / real estate markets:

    a. Increasing the number of qualified professionals, capable of performing third-party controls;
    b. Reducing the degree of asymmetric information in the market, granting public access to information on designers' qualifications;
    c. All professional building designers covered by insurance.

3. Increasing the international visibility of Georgian professionals and business companies operating in the construction sector:

    a. Increasing the number of professional building designers and businesses admitted to international competitions.

Table 8. Summary of Objectives

OBJECTIVE	INDICATOR	RESPONSIBILITY	TIMING
Safety/Uncertainty			
All new authorized buildings designed by professionals with a satisfactory knowledge of safety-related best practices and regulation	Share of new buildings designed by certified professionals	Municipal and State authorities	100% from the end of the transition period (2017) onwards
All major renovations and newly built buildings designed by professionals with a satisfactory knowledge of safety-related best practices and regulation	Share of people living in buildings designed by (or renovated under the supervision of) certified professionals	Municipal and State authorities	80% by 2029
Ensuring an adequate number of building designers with a satisfactory knowledge of safety-related best practices and regulation	1. Number of professionals tested 2. Number of professionals receiving certification	Public authorities and professional associations	13000 professionals tested by 2017; about 1000 in each following year until 2029
Ensuring an adequate number of qualified professionals, capable of performing third-party controls			65% of those tested in the first two years and 50% of those tested in the following years receiving certification (assuming the best/more experienced take the exam before).
All professional building	Percentage of	Public authorities,	50% of

designers with insurance	professional building designers engineers with insurance	professionals, construction companies	professional building designers insured by 2020; 100% by 2025
International Visibility			
Increasing the number of professionals who could participate to international competitions	Share of certified professionals (who could participate to international competitions)	Public authorities, professional associations, associations of construction companies	100% from the end of the transition period (2017) onwards

V. POLICY OPTIONS

This section presents the policy options selected after consulting with stakeholders, identifying the nature of the problem to be solved and defining the objectives policy options should help achieve.

Before introducing the policies that were selected, three options that were discarded at an early stage are described below:

- The possibility that the government does not introduce any certification but performs directly all the checks necessary to ensure that both the design and the implementation of all new buildings are performed abiding to the desired safety standards. This option has been discarded because it is both too costly and unfeasible.

- The possibility that the government relies on safety controls performed by insurance companies, as it happens in France. This option has been discarded because it is currently unfeasible. In Georgia, the insurance market against the risks of the construction sector is still underdeveloped and the lack of a reliable certification process is even preventing the development of the insurance market for professionals operating in the construction sector.

- The possibility that the government manages directly and completely the certification process in all its phases. We discarded this option mostly because it is less efficient and more costly than the other options considered. Leaving to the government the full responsibility to design, administer and evaluate the whole certification process could prove costly and extremely challenging. The construction sector is a continuously changing environment, affected by the emergence of new techniques, new technologies and new materials. Making sure the certification process remains up to date requires a continuous effort to monitor the changes and update the process itself. Preparing and administering exams would require maintaining a large infrastructure and employing continuously a sufficiently large number of experts in order to ensure it would run smoothly. To increase the complexity of the problem, theoretical knowledge of the technical and of the technological progress is not sufficient to operate in the market. As time passes the certification process would have to adapt and to incorporate a number of practical issues emerging on the marketplace, from the encounter between supply and demand. The optimal balance of skills, experience and knowledge in different areas (including the ones that will emerge) is likely to change as time passes. Failure to incorporate these changes in the certification process in a timely fashion might reduce the effectiveness of the certification. Professionals working in the sector every day have – in this respect – an obvious advantage with respect to the public authorities. Excluding them from the process, therefore, would be a mistake. On this, indeed, all the stakeholders we interviewed, agreed. This is why in both policies that are compared to the “no policy change” option (baseline scenario) market professionals are involved in the preparation and administration of the exam and in the management of the national certification system.

The key differences between the three options analyzed are the following:

1. In the “no policy change scenario” no certification is introduced;
2. In Option 2 the national certification system is entirely managed by the professional associations;
3. In Option 3 professional associations and public authorities manage the national certification system jointly.

In all scenarios, the population will be assumed to remain stable, based on United Nations[7] estimates and the overall economy will be assumed to develop following recent trends.

A. POLICY OPTION 1: NO POLICY CHANGE (BASELINE SCENARIO)

Under this scenario, the construction legislation is not changed and nothing is done to alter the current trends. This implies that the risk of a deterioration of the safety of the housing stock will not be averted, nor will be averted other negative consequences of the existing asymmetric information and negative externalities on the functioning of the construction market and on the competitiveness of Georgian businesses and professionals wishing to operate in international markets.

Evolution of the construction sector (square meters designed) and of the demand for building designers

Of particular interest will be the evolution of the construction sector. The assumption was made that the construction sector will grow at approximately 4% per year (net of stock depreciation) until 2029, with the square meters designed increasing at 5.5% per year, to take into account maintenance and renovation of existing buildings. These values have been chosen after analyzing the trends characterizing new construction permits and the growth of Gross Domestic Product (GDP) generated by the construction sector in the last years[8].

Given the evolution of the construction sector, the demand for building designers until 2029 was estimated assuming a standard productivity for building designers (average number of square meters designed per year[9]). The demand was then compared to the existing stock of architects / civil engineers designing buildings, adjusted to take into account of a “natural rate of depreciation” of the human capital (equal to the average death rate in Georgia for individuals of the same age groups) and of the new inflows of architects / civil engineers. In line with the information collected during our data gathering, the assumption was made that not all architects / civil engineers are really qualified for the job. Our assumption is that only 75% of them is really capable of designing safe buildings[10]. The new inflows of architects / civil engineers from 2014 to 2029 are estimated to be constant and consistent with the trends observed in the last years. Finally, last assumption is that enough other building designers join the market to keep the real wage rate for building designers constant (as it

[7] Source: United Nations, Department of Economic and Social Affairs, Population Division, Population Estimates and Projections Section

[8] We also produced analyzed a low and a high growth scenarios, with the number of square meters designed increasing respectively 3% and 8% per year.

[9] We chose to use in our calculation a value of 780 square meters designed per year (slightly higher than the average number of square meters designed on average by Georgian building designers in the period 2010-2012).

[10] This number has been chosen arbitrarily. Obviously, choosing a lower percentage of qualified building designers would increase the benefits of the reform, while reducing it would diminish them.

has been in the last years). Other building designers are assumed to be even less likely to design safe buildings (only 50% is assumed to be really capable of designing safe buildings in our "most likely scenario"[11]). These assumptions, while arbitrary, strike us as conservative, given the outcomes of our consultation process, in which all stakeholders emphasized the currently low standards of building design.

Safety

As implied by our assumptions, the number of building designers without the appropriate qualification is likely to continue increasing as time passes and the share of (well educated and experienced) architects / civil engineers among building designers decreases. This is likely to cause a sub-standard safety level among newly built buildings. As time passes, this can be be expected to cause excessive human and economic losses associated with accidents. Most costs will be borne by those living in the buildings but also the government and the society at large is likely to incur substantial costs as human and physical capital are lost. Among the safety-related costs that have been estimated, relatively to the baseline scenario, are:

- Deaths caused by fire
- Direct fire losses
- Expected damages from earthquakes

Other potential costs in terms of deaths caused by earthquakes and other health issues related to bad building design were not quantified (but will nevertheless be discussed in the analysis section).

Other costs

In addition to safety costs, the absence of certification is likely to cause a number of negative effects, among which:

- higher costs for the judiciary system due to a higher number of court cases related to bad designs (and a negative impact on the public budget);
- higher costs associated with more interventions required to extinguish fires;
- an increase in the perceived riskiness of investing in the Georgian real estate market, potentially causing a slowdown in its development;
- potential problems for Georgian professionals and businesses aiming to expand their activities abroad – especially in developed countries.

The identified costs were quantified whenever possible. In all other cases we will discuss them from a qualitative point of view.

[11] This number has been chosen arbitrarily. Obviously, choosing a lower percentage of qualified building designers would increase the benefits of the reform, while reducing it would diminish them.

B. POLICY OPTION 2: NATIONAL CERTIFICATION PROCESS ENTIRELY MANAGED BY PRIVATE OPERATORS (PROFESSIONAL ASSOCIATIONS)

In this scenario, the government introduces the requirement of a national certification for building designers. The design, preparation and administration of the procedure is – after the transitory period (years 2015 and 2016) – left solely to professional associations, while the responsibility for data storage (including the registry for building designers), data protection and for the reliability of data transmission - to public authorities. The responsibility to ensure that the preparation of certified the members of the association remains adequate is left to professional associations, as well as the responsibility to withdraw the certification when it does not remain adequate (this extends to cases in which there is evidence a certified builder has committed a serious mistake). The public authorities retain at most an external (nominal) supervisory role. The certified building designers will have to retake the exam (to confirm the validity of their certification) once every five years.

Evolution of the construction sector (square meters designed) and of the demand for building designers

The regulatory change is expected to have an impact on the evolution of the construction sector. Assumptions are that, thanks to the certification, the degree of information asymmetry in the construction and real estate markets will decrease and the average safety level of newly constructed buildings will increase to the desired level.

For the years 2014, 2015 and 2016 the market for building designers and the construction market are assumed to behave exactly like in the baseline scenario, due to the fact that the certification will not be required in order to design buildings. Starting from 2017, however, only a fraction of the building designers active until 2016 is expected to be certified, due to the exit of building designers without the appropriate qualification (e.g. without the degree in design / construction) from the regulated part of the market. The smooth functioning of the construction market will, therefore, require that other individuals enter the labor market and become certified building designers.

The reform is expected to cause an increase in salaries for the certified building designers and, as a consequence, an increase in building prices. The extent to which salaries will increase will depend on elasticity of supply of certified building designers with respect to wages and on the elasticity of demand for certified building designers with respect to wages.

The effect of the increase in designer wages on housing prices and the feedback on the demand for certified building designers (higher wages increase total construction costs and housing prices) is explicitly taken into account in calculations. In this scenario, because of the increase in overall construction prices, the total amount of square meters being designed is lower compared to the baseline scenario.

On the other hand, an increase in the average quality of the newly constructed buildings and a reduction in the safety risks and in the uncertainty about the safety of the buildings, which might partially counteract the price effect, is also assumed.

Safety

As reflected by assumptions, in this scenario the number of non-qualified building designers is expected to go to zero at the end of the transition period. Because of this, the preparation of certified building designers is assumed to become adequate and homogeneous, with 100% of certified building designers capable of designing safe buildings. This is going to have a large (and positive) effect on the average quality of the newly built buildings, with unsafe buildings no more being designed. In the longer period, this is going to affect positively the average quality of the whole housing stock, as older (unsafe) buildings are demolished or renovated according to new regulations and best practices. As time passes, a substantial decrease in human and economic losses associated to accidents with respect to the baseline scenario can be expected. A crucial assumption is that old buildings will not be destroyed until their economic life ends, regardless of the fact that new (safer) buildings are built. Given this reason our estimated gains are likely to underestimate the true gains from the reform. Most benefits will affect those living in the buildings, but also the government and the society are going to benefit as human and physical capital losses are going to decrease. As in the baseline scenario, among the safety-related costs that we have estimated, are:

- deaths caused by fire
- direct fire losses
- expected damages from earthquakes

As in the baseline scenario, in the analysis section other potential costs in terms of deaths caused by earthquakes and other health issues related to bad building design are also discussed.

Other costs

The additional benefits (lower costs and losses) associated with this alternative scenario are:

- lower costs for the judiciary system due to a lower number of court cases related to bad designs (and a lower negative impact on the public budget);
- lower costs associated with more interventions required to extinguish fires;
- a reduction in the perceived riskiness of investing in the Georgian real estate market, potentially stimulating its development;
- more opportunities for Georgian professionals and businesses aiming to gain visibility (for example through the participation to international competitions) abroad – especially, in developed countries.

Among the additional costs of this option are the costs relative to the implementation of the certification system, including the material costs for hardware, software, the compensation of those designing and administering the exam and the opportunity costs of time spent studying and fees paid by the examinees.

The identified benefits and costs will be quantified whenever possible. In all other cases they will be discussed from a qualitative point of view.

Risks

The following are the potential risks for this option:

- Incentive for the professional associations to limit the access to the certification. This, in addition to reducing competition and leading to excessively high compensations for the certified members, could cause an increase in exam costs. Obviously this would also lead to a loss of opportunities for excluded (qualified) building designers, to and could lead to the emergence of bottlenecks leading to a slower development of the construction sector (with the emergence of a deadweight loss for the society at large);

- Incentive for professional associations to "side" with certified members in case of mistakes or anytime the "extension" (or the upgrade) of the certification is required. On one hand, the professional association might be reluctant to take extreme actions such as the expulsion of existing members in case of mistakes, for fear of incurring a loss of reputation of the certification system. On the other hand, once existing members apply for an upgrade (or renewal) of their certification, the incentive to be strict in allowing the upgrade will be lower, compared to what happens in the case of "outsiders";

- The responsibility for exam administration (including exam storage and exam protection) is left entirely to the professional associations. Insufficient investments on its reliability could lead to a loss of credibility of the certification system and / or to inefficiencies affecting negatively the functioning of the process to authorize new constructions.

These three sources of risk are nontrivial as all have the potential to significantly reduce the net gains associated with the introduction of the certification.

C. POLICY OPTION 3: NATIONAL CERTIFICATION PROCESS JOINTLY MANAGED BY PRIVATE OPERATORS (PROFESSIONAL ASSOCIATIONS) AND PUBLIC AUTHORITIES

In this scenario, as in Option 2, the Government introduces the requirement of a national certification for building designers. In this case, however, all the aspects of the process – after the transitory period – are managed jointly by the professional associations and public authorities. This also includes the responsibility to ensure that the preparation of certified members of the association remains adequate and to withdraw the certification when it should not be valid anymore (this extends to cases in which there is evidence that a certified builder has committed a serious mistake). A similar model is applied successfully in Germany and in other developed countries. Also in this case the certified building designers will have to retake the exam (to confirm the validity of their certification) once every five years.

Evolution of the construction sector (square meters designed) and of the demand for building designers

In Option 3, as in Option 2, thanks to the certification, the degree of information asymmetry in the construction and real estate markets is expected to decrease and the average safety level of newly constructed building is expected to increase.

In this instance, we expect the entry of new individuals in the labor market for building designers and a pressure towards the increase of the real wages for building designers in construction sector. In Option 3, however, the joint supervision of the process by professional associations and government representatives should help ensuring certification criteria are not going to be excessively tight and access to the profession is not artificially restricted in order to push up the compensations of the insiders.

Compared to what could be observed in Option 2 it is expected therefore:

- a greater sensitivity of the supply of certified building designers to the increase in wages;
- a smaller increase in wages;
- a smaller decrease in the number of square meters designed per year (and, therefore, no deadweight loss for the society).

As with Option 2, calculations of the effect of the increase in salaries on housing prices and the feedback on the demand for certified building designers is explicitly taken into account.

On the other hand, an increase in the average quality of the newly constructed buildings and a reduction in the safety risks and in the uncertainty about the safety of the buildings, which might partially counteract the price effect, is also assumed.

Safety

In this scenario, the number of non-qualified building designers is expected to go to zero at the end of the transition period. As in Option 2, this is expected to have a large (and positive) effect on the average quality of the whole housing stock, as older (unsafe) buildings are demolished or renovated according to new regulations and best practices. As time passes, a substantial decrease in human and economic losses associated with accidents with respect to the baseline scenario can be expected. This effect is expected to appear faster under this option, as the number of new square meters built is expected to be larger than in Option 2.

The availability of a larger stock of new and well-designed buildings, with respect to Option 1 and 2, implies that this option is the one with the lowest level of human losses caused by fires, earthquakes and other health-affecting events. The values of the material losses instead (while lower than in the baseline scenario) are expected to be larger in this case than in the Option 2, because of the larger increase in the housing stock and of our assumption that old buildings are not being destroyed as new ones are built. Without such an assumption, the benefits of this option would be the largest both with respect to human and material losses.

Most benefits will occur those living in the buildings but also the government and the society are going to benefit as human and physical capital losses are going to decrease. As in the baseline scenario, among the safety-related costs that have been estimated, are:

- deaths caused by fire;
- direct fire losses;
- expected damages from earthquakes.

As for the other options, there are other potential costs in terms of deaths caused by earthquakes and other health issues related to bad building design that have not been quantified but will be mentioned in the analysis section.

Other costs

Additional benefits (lower costs and losses) associated with this scenario are:

- lower costs for the judiciary system due to a lower number of court cases related to bad designs (and a lower negative impact on the public budget);
- lower costs associated with more interventions required to extinguish fires;
- a reduction in the perceived riskiness of investing in the Georgian real estate market, potentially stimulating its development;
- more opportunities for Georgian professionals and businesses aiming to expand their activities abroad, especially in developed countries.

It is expected that some costs are going to be different than in Option 2. In particular:

- the opportunity costs of time spent studying should be lower, given that access to the profession is not restricted (which implies lower probability of failing the exam if adequately prepared);
- one should add to the costs of Option 2 the compensation of public officials participating to the management of the certification system.

Again, the identified benefits will be quantified whenever possible. In all other cases they will be discussed from a qualitative point of view.

Risks

This solution, in which the government co-manages the system of certification should help reducing the risks associated with Option 2:

- that the professional associations restrict the access to the certification, thereby reducing competition and leading to higher than optimal compensations for the certified builders;
- that non-qualified professionals are allowed to retain (or even to upgrade) their certification;
- that the system for exam administration (including data protection and data management) is inadequate and insufficiently reliable.

Due to the reduction in these risks, a higher probability of observing the realization of the expected net gains associated to the introduction of the certification is expected.

On the other hand, this solution also faces a few risks:

- the risk of an excessive influence of the public authorities, reducing the flexibility of the system and its capacity to adapt to the needs of a continuously changing environment;
- the risk of “capture” of the representative of public authorities, unwilling to question decisions taken jointly about disciplinary sanctions and / or upgrades.

VI. ANALYSIS OF IMPACTS

A. METHODOLOGICAL APPROACH

The methodology applied in the analysis of the impacts is Cost Benefit Analysis (CBA), coupled with qualitative analysis for the components that were impossible to quantify given time and data constraints.

A first important observation was that, while the narrow focus of the reform is going to be on the market for building designers, the effects of this reform will be felt also in the construction market, in particular through the change in the externalities generated and in the government revenues.

In the primary market for building designers the following effects were estimated:

- costs associated with the certification exam;
- potential effects of the different options of certification (Option 2 and 3) on exam costs and on deadweight losses in the market for certified building designers;
- change in the demand and supply of building designers;
- change in the average wage for building designers.

It was, unfortunately, not possible to estimate directly the amount of welfare lost by consumers in the market for building designers due to the existence of asymmetric information and, therefore, the potential gains associated with the introduction of certification. From the theoretical point of view it is clear, however, that the current system is benefiting non-qualified building designers and hurting both qualified building designers, consumers and the society as a whole.

Part of the losses associated with the current state of things was captured while analyzing the (secondary) construction market, as it is clear that a bad building design causes negative externalities to arise in this market. The analysis aimed at quantifying the expected costs associated with bad design of buildings, particularly in the following areas:

- excess deaths due to fire, caused by bad design;
- excess economic losses due to fire, caused by bad design;
- excess deaths due to earthquakes, caused by bad design;
- excess economic losses due to earthquakes, caused by bad design.

For the quantification of these costs a substantial amount of information both concerning Georgia and other countries was collected. The only item of this list that could not be quantified was the number of excess deaths due to earthquakes caused by bad design. This was caused by the scarcity of data about deaths caused by earthquakes and by the multitude of factors that could affect the number of deaths.

To have a better picture the expected impact of the different alternatives on government budget was also estimated. Given that the reform is expected to affect indirectly the number of buildings built, as well as their price, two main effects on the government budget were identified and estimated (even though not included in the final calculation of the potential gains):

- change in the amount of Value Added Taxes (VAT) collected from the sales of newly built buildings;
- change in the property taxes collected on newly built buildings.

Analysis Data Sources:

- GeoStat;
- information collected through interviews and stakeholder consultations;
- MoF of Georgia;
- Supreme Court of Georgia;
- Statistical data from other countries and international organizations;
- Other publicly accessible information.

General assumptions common to all options were:

- a stable demographic profile (unchanged population)
- common macroeconomic trends (average, high and low growth of GDP produced by the construction sector)
- no change in other policies (for example: taxation of property, VAT rate, introduction of better standards in the construction sector).

A time horizon of 15 years (taking into account of a 2-year transition period) was chosen.

The discount rate used was 7% (with sensitivity analysis at 6% and 8%).

After quantifying the expected impacts in each area for each alternative the expected NPV of all alternatives was determined.

In all the cases in which the quantification of costs and benefits was not possible, a qualitative evaluation of the incremental costs and benefits of different options with respect to the baseline scenario was prepared, in the attempt to produce at least a ranking of the impacts (costs and benefits).

Given the high degree of uncertainty the robustness of the results was tested by examining a large number of alternative scenarios (high growth and low growth of the construction sector; higher and lower discount rates; high and low elasticity of labor supply in the labor market for building designers; high and low intensity of earthquakes; high and low VSL).

B. ANALYSIS OF IMPACTS

A summary of qualitative impact analysis is presented below:

Table 9. Summary of impacts of selected options

IMPACT	OPTION 1 Baseline scenario	OPTION 2	OPTION 3
Administrative	No change	Need to define, organize and manage the certification system, ensuring necessary resources are available during the transition period.	Need to define, organize and manage the certification system, ensuring necessary resources are available during and after the transition period.
Economic	No change	Administering the exam has costs (including opportunity costs associated with the time spent preparing for the exam). These are economic costs which exist regardless of who pays the monetary costs of setting up the exam. Substantial reduction of the information asymmetries in the market for building designers and of the negative externalities in the construction market is expected. The effects are both of economic and distributional nature. Non-qualified building designers, who are expelled from the market are the losers. Their losses go to the advantage of consumers, who now pay an amount corresponding to the true value of what they get, and to qualified building designers, whose salaries increase. Insofar as the information asymmetry is reduced, the society as a whole benefits from a gain in efficiency and a reduction in negative externalities associated with bad	Administering the exam has costs (including opportunity costs associated with the time spent preparing for the exam). These are economic costs which exist regardless of who pays the monetary costs of setting up the exam. Substantial reduction of the information asymmetries in the market for building designers and of the negative externalities in the construction market is expected. The effects are both of economic and distributional nature. Non-qualified building designers, who are expelled from the market are the losers. Their losses go to the advantage of consumers, who now pay an amount corresponding to the true value of what they get, and to qualified building designers, whose salaries increase. Insofar as the information asymmetry is reduced, the society as a whole benefits from a gain in

IMPACT	OPTION 1 Baseline scenario	OPTION 2	OPTION 3
		design. Part of the potential benefits are lost due to incentives for the professional associations to limit the access to the profession. Economic costs associated with the exam are expected to increase after the transition period.	efficiency and a reduction in negative externalities associated with bad design. The active involvement of government officials in the process increases the likelihood that all potential benefits are reaped. Economic costs associated with the exam are expected to remain lower than in Option 2.
Social	No change	The introduction of the reform is likely to affect in an asymmetric way different parts of the society. In general, all the buyers of newly built houses will benefit from living in safer houses, prices of which, however, might be higher. The potential increase in prices might affect negatively the poorest households that might not be able to afford moving into new (and safer) houses. Another collateral effect of the reform might be a reduction in the number of workers hired by the construction sector, and / or a downward pressure on their wages to compensate for the increased compensation for building designers. It is expected, however, that these effect will be minor. The potentially negative effects are likely to be stronger in this option than in Option 3 due to the incentives for the professional associations to limit the access to the profession.	The introduction of the reform is likely to affect in an asymmetric way different parts of the society. In general, all the buyers of newly built houses will benefit from living in safer houses, prices of which, however, might be higher. The potential increase in prices might affect negatively the poorest households that might not be able to afford moving into new (and safer) houses. Another collateral effect of the reform might be a reduction in the number of workers hired by the construction sector, and / or a downward pressure on their wages to compensate for the increased compensation for building designers. It is expected, however, that these effect will be minor. The potentially negative effects are likely to be less strong than in Option 2 due to active involvement of government officials in the process, guaranteeing a more open access to the profession.

IMPACT	OPTION 1 Baseline scenario	OPTION 2	OPTION 3
Environmental	No change	Not easily quantifiable. The exclusion of not qualified building designers from the market might have a positive impact, even more if the certification exam will test also the knowledge of best practices allowing for the design of green buildings. This consideration however is not included in the analysis.	Not easily quantifiable. The exclusion of not qualified building designers from the market might have a positive impact, even more if the certification exam will test also the knowledge of best practices allowing for the design of green buildings. This consideration however is not included in the analysis.
Public financing	No change	Impacts on public financing will be of two main types: • Direct: costs associated with the establishment, organization and management of the exam in the transition period. The budget will be affected more negatively if the government decides not to charge fees. Even if the government decided to make the test-takers pay, due to the fact that revenues (fees) might occur later there would still be need to finance the upfront costs in the short term. • Indirect costs / benefits: a reduction in the number of new houses built, accompanied by an increase in their price has a short term positive effect in the average growth scenario due to the increase in VAT (more than compensating the slight loss observed in the revenues from the property tax). Gains are larger in Option 2 than in Option 3 both in our average and low growth scenarios and	Impacts on public financing will be of two main types: • Direct: costs associated with the establishment, organization and management of the exam in the transition period and afterwards. The budget will be affected more negatively if the government decides not to charge fees. Even if the government decided to make the test-takers pay, due to the fact that revenues (fees) might occur later there would still be need to finance the upfront costs in the short term. Costs per test taker associated with this option are expected to be higher after the transition period (relative to the other option) as it will be necessary to pay the wage of government officals involved in the process. On the other hand, if the presence of government officials reduced the risk of a restriction to entry, total costs might turn out to be lower.

IMPACT	OPTION 1 Baseline scenario	OPTION 2	OPTION 3
		smaller in the high growth scenario.	• Indirect costs / benefits: a reduction in the number of new houses built, accompanied by an increase in their price has a short term positive effect in the average growth scenario due to the increase in VAT (more than compensating the slight loss observed in the revenues from the property tax). Gains are lower than in Option 2.
Labor market	No change	A high impact in the labor market for building designers is expected, with an increase in salaries and new working opportunities for qualified building designers and the expulsion of non qualified ones. The true availability of qualified designers remains unknown. It has been assumed that the wage increase will manage to attract back into the market enough architects / civil engineers which are currently unemployed (or working in other occupations or abroad) to satisfy demand, giving them the incentive to study for the exam. The response of architects / civil engineers is very important to ensure that bottlenecks which could prevent the development of the construction sector do not emerge. In all of assumptions (including the most conservative ones) the potential frictions in the labor market were never large enough to offset the gains of the reform. Option 2 seems the riskier in this respect, because of the	A high impact in the labor market for building designers is expected, with an increase in salaries and new working opportunities for qualified building designers and the expulsion of non qualified ones. The true availability of qualified designers remains unknown to us. It has been assumed that the wage increase will manage to attract back into the market enough architects / civil engineers which are currently unemployed (or working in other occupations or abroad) to satisfy demand, giving them the incentive to study for the exam. The response of architects / civil engineers is very important to ensure that bottlenecks which could prevent the development of the construction sector do not emerge. In all of assumptions (including the most conservative ones) the potential frictions in the labor market were never large enough to offset the gains of

IMPACT	OPTION 1 Baseline scenario	OPTION 2	OPTION 3
		incentives for the professional associations to limit the access to the profession, who might make it more costly for potential candidates to take and pass the exam.	the reform. Option 3 seems less risky than option 2, as in this case public officials with their presence could make sure there is no attempt to limit the access of new certified building designers into the market.
SMEs	No change	There are not enough elements to assess the true impact of the reform on SMEs. One risk is that the increase in the costs or hiring certified building designers might reduce their profit margins. Option 2 seems the riskier in this respect.	There are not enough elements to assess the true impact of the reform on SMEs. One risk is that the increase in the costs or hiring certified building designers might reduce their profit margins. Option 3 seems less risky than Option 2.
Other	No change	The adoption of a certification system for building designers is expected to help the development of the insurance market for building designers.	The adoption of a certification system for building designers is expected to help the development of the insurance market for building designers.

High impact **Medium impact** **Low impact**

C. COST AND BENEFITS ANALYSIS

INTRODUCTION

In order to properly evaluate the different effects of the adoption of alternative certification systems with respect to each other and to the baseline scenario it was necessary to adopt a set of common assumptions:

- Georgian population is assumed to remain constant, on the basis of United Nations projections.
- The composition of the stock of buildings in 2013. It was arbitrarily decided for a stock composed by 67% of well designed buildings and 33% of poorly designed buildings. The evolution of this ratio is identical for all alternatives until 2017. Afterwards, the trends differ.
- The percentage of non qualified building designers among architects and civil engineers and among the others. It was opted for the following percentages: 25% non qualified building designers among architects and civil engineers and 50% among others.
- Each building designer is assumed to design on average 780 square meters per year (a good approximation of the average number of square meters designed on average in the years 2010-2012 in Georgia and compatible with international practices - table 7). This number of square meters is used to estimate the expected demand for building designers in each years.
- In the baseline scenario it is assumed that the supply of non-architects / non-civil engineers can easily ensure that any change in demand is matched. Therefore no bottlenecks emerge and the real average wage for building designers is assumed to stay constant at 800 GEL per month. The situation changes when the certification is introduced. It will be discussed further in the analysis.
- The robustness of results was tested also in high and low growth scenarios (respectively 3% and 8% growth of the construction sector per year). The depreciation rate is assumed to be approximately 1.4% (compounded) per year (compatible with an expected lifetime of 50 years for a building).
- Direct fire losses - the cost of repairing fire damage – were calculated following the methodology adopted by the leading international think tank of the insurance industry, The Geneva Association. The methodology expresses direct fire losses in percentage of a country's GDP. Looking a the Georgian data available (from 2003 to 2008) and at the international data provided by The Geneva Association we decided to adopt the values 0.07% and 0.021% of GDP to estimate the amount of direct fire loss costs for not well designed buildings and well-designed buildings respectively[12]. After estimating the value of losses per square meter in 2013, this average value was used to estimate the fire losses in the following years in all scenarios.

[12] For a full explanation of the methodology and of the assumptions, check Annex A.

- Number of people dead because of fires. These numbers were estimated on the basis of Georgian data cross referenced with data from the Geneva Association's annual report about the World Fire Statistics (years 2009-2010). The death rate per 100,000 population living in good quality buildings was assumed to be 1.56 (average number for Georgia based on Geneva Association report for 2009-2010 – before the effects of the adoption of the current Code on building safety could be fully felt) and for low quality buildings is 3.07 (which is average fire deaths per 100,000 population for countries in Eastern, Central and South Eastern Europe and Central Asia for 2008-2010). In order to estimate the monetary value of lives lost a VSL of 1,532,398 GEL was assumed[13].

- Judiciary costs related to the bad design. While calculating state costs of judiciary system it was assumed that cases will arise only for new buildings not well designed. To come up with the total state budget expenditure per case for common courts, total state budget expenditure common courts (GEL) and total number of filed cases (civil, administrative and criminal ones) was used[14].

- Earthquake damages[15]. Three earthquake zones were identified: Tbilisi, Adjara and the rest of Georgia. For each one of these, based on the estimates from the Institute of Geophysics (1999, Tbilisi) and on the relation between type of structure, MSK intensity of earthquakes and damages to buildings, the expected economic losses associated with a potential earthquake hitting the country were estimated. Expected economic losses depend on probability of earthquakes, expected intensity, type of structure. Obviously higher damages to non-well designed buildings were assumed, as well as lower damages to well designed buildings[16].

- Earthquake human losses: it could not be estimated the number of excess deaths due to earthquakes caused by bad design. This was caused by the scarcity of data about deaths cause by earthquakes and by the multitude of factors that could affect the number of deaths.

As mentioned in the methodological part, to test the robustness of our results, additional figures were also calculated:

- VAT (18% rate) on the new stock built the moment it is sold. It would increase government revenues.

- Property taxes on the stock of buildings. Estimated on the total stock existing in any given year. In Georgia the property tax ranges between 0.05% and 0.2% for household whose income exceeds 40,000 GEL up to a maximum value of 1% when household income exceeds 100,000 GEL. It was decided to adopt a conservative

[13] Explanation of the number is given in Annex A.

[14] It is important to mention that these costs refer only to cases discussed in front of the Georgian courts, excluding the Supreme Court. This implies that these costs are likely to represent a conservative measure of the judiciary costs associated with building design issues.

[15] A detailed explanation of the methodology is in Annex B.

[16] The percentages of disruption have been calculated on the basis of Medvedev, S.W., Sponheuer, W., and V. Karnik. (1965). "Seismic Intensity Scale Version MSK 1964". UNESCO, Paris.

approach and estimate property taxes applying a 1% tax to the value of 1.63% of the stock of buildings (1.63% represents the share of individuals for whom household income exceeds 40,000 GEL per year).

OPTION 1: BASELINE SCENARIO

Costs

The costs associated with the baseline scenario are mostly of economic (but not necessarily monetary) nature with some important distributional consideration to be made.

Market for building designers

Some of these costs are directly related to the market for building designers. The costs in the market for building designers emerge because of the asymmetry of information about the true quality of building designers and imply both a redistribution of economic surplus and overall loss for the society. Demand for building designers' services is excessive, because of the asymmetric information. Customers receive a quality lower than they expect, given the price they pay. On the other hand, qualified building designers are forced to compete with less qualified designers who compress their wages. The only ones gaining in this picture are the non-qualified building designers, who manage to sell their services. Unfortunately, their gains are more than compensated by the losses of the other two groups[17]. While the exact amount of the net losses could not be quantified, it is important to underline their existence.

Other costs

In addition to the costs in the market for building designers, a number of other social costs increase due to the poor design of buildings. Among them:

Fire costs:

- Direct fire losses are the highest in this scenario for two reasons:
    1. the number of square meters constructed is the highest;
    2. non-qualified designers are working all along, therefore, the share of buildings "fire-unsafe" is the highest.
- Human losses are the highest in this scenario, as a large number of individuals do not have the possibility to leave an "fire-unsafe" building for a "fire-safe" ones.

Costs for the judiciary system (relative to building design issues). They are the highest in this scenario as it is assumed that only badly designed buildings are causing people to go to court. Therefore, by excluding non-qualified designers from the market the number of cases is bound to drop (we assume it goes to zero). In our analysis we excluded revenues

[17] This result, that cannot be easily quantified in this case, remains nevertheless qualitatively very solid and is shown in Figure 7 in annex C.

generated by the activity of the courts as the data collected indicated they were negligible compared to the costs[18].

Earthquake costs:

- Earthquake damages are the highest in this scenario for the same reasons as fire costs are:
    1. The number of square meters constructed is the highest
    2. non-qualified designers are working all along, therefore, the share of non-antisismeic buildings is the highest.
- Earthquake human losses are the highest in this scenario, as a large number of individuals do not have the possibility to leave unsafe building for safe ones. These costs, however, are not quantified.

Administrative costs: they are the lowest in this scenario as there is no need to define, organize and manage the certification system.

Environmental costs: the poor design of buildings causes higher than necessary consumption of energy and, potentially, a more damaging impact on the environment. These costs, however, are not quantified.

Public costs: this is the only alternative that does not require an upfront contribution from the public budget. However, in case of accidents (fires, earthquakes), this is also the alternative that could imply the largest costs. These costs are included in the previous items.

Benefits (not included in our final analysis)

Revenues: the revenues included in the baseline scenario are revenues from VAT and property taxes which accrue to the public budget. In this scenario the quantity of buildings produced is the highest. On the other hand, the value per square meter of these buildings is expected to be lower. The final result in terms of contribution to the public budget changes as assumptions change. In standard growth scenario and in the low growth scenario, public revenues in this scenario are lower than for the remaining two alternatives. In the high growth scenario public revenues are highest in this scenario.

OPTION 2: CERTIFICATION ADMINISTERED BY PROFESSIONAL ASSOCIATIONS

This option is the one in which the number of square meters produced reduces the most (with respect to the baseline scenario) after the transition period due to the assumption that the professional associations will attempt to limit the access to the profession. In the calculation this reflects in a slower increase in the number of professionals with respect to option 3, given the same salary increase. In the main estimates it was assumed that an increase of 1% in the wage offered would imply an increase of 1% in the supply of total hours worked by certified building designers (taking into account both the inflow of new certified building designers and an increase in the number of hours worked by each certified

[18] Moreover, our costs did not include costs associated with the activity of the Supreme Court and were, therefore, already constituting a lower bound to the judiciary costs.

building designer) in Option 2 (price elasticity of supply is 1) and increase of 2% in Option 3 (price elasticity of supply is 2).

Costs

Market for building designers

In this scenario there is no more social loss due to asymmetric information. However, the potential restriction of the access to the profession operated by professional associations can cause a net loss of surplus. The exclusion of a part of the potential designers from the market (compared to Option 3) causes:

- the loss for the excluded qualified building designers;
- the loss for the consumers (who pay higher wages and obtain less services);
- the gain for the qualified building designers that get the certification.

The gains for the insiders are not sufficient to compensate for the losses of the other two groups (see figure 8 in Annex C).

Certification costs

Option 2 (like Option 3) requires to organize exams, administer them and take care of data storage, assuring registry data are constantly safe and available to all the interested parties. After consultations with the ministry it was decided to exclude from the costs those associated with keeping the registry and assuring its safety as this service will be provided (at a negligible marginal cost) by the ministry of justice who has already the relevant infractructure in place.

The remaining costs include:

- Costs for the creation and the maintenance of the database of questions: a database of 4,000 questions was assumed to be needed. This database will have to be created at the beginning of the first year of implementation and will require the work of local as well as international experts. The cost of 18 GEL (the cost of ½ hour of time – net of taxes for a Georgian Technical University professor[19]) per question for the local expert was assumed. For the international expert (acting as a consultant and supervisor) 60,000 GEL in the first year was assumed. After then it was assumed that the system will be managed and updated only by local experts. It was assumed that every year 5% of the questions in the database would be updated or replaced.

- Costs for exam administration. The average cost of use (rental) of a room for 100 applicants for one day is 1050 GEL. To this must be added the cost for the staff in charge of the supervision (15 supervisors per classroom – 30 GEL per day) and of the experts (GTU professors, 2 hours per exam) in charge of grading each exam. These costs were estimated to get a reliable picture of the exam costs and of the tuition fees to be charged in order to have the costs covered.

[19] The net hourly wage of a full professor at GTU is 36 GEL as we learned from our consultation with GTU professors.

- Opportunity cost for test takers*:* on the basis of the information collected during our consultations it was assumed that 150 hours will be spent on average by the test taker to prepare for the exam. Average opportunity cost of time is 4.11 GEL per hour (average hourly wage for employed individuals having studied as architects / civil engineers, but doing some other job).

- Two person / months of work by government officials for each year during each transition year (monthly salary net of taxes estimated to be 1680 GEL).

Total exam costs are the highest in Option 2, starting from the end of the transition period, because of the assumption that the professional associations will try to limit the access to the profession in order to increase the average compensation for their members. If a lower percentage of prepared candidates passes the exam in Option 2[20], in order to satisfy the same market demand for building designers, either more candidates should take the exam or the same candidates are likely to have to take the exam more times. In both cases total exam costs increase. All the assumptions relative to certification costs are explained in greater detail in Annex D.

Other costs

Fire costs:

- Direct fire losses are the lowest in this scenario because of two assumptions:

    1. the number of old buildings standing is identical in Option 2 and 3;
    2. the assumption that, due to the attempts of the professional associations to limit access to the profession, in this scenario there is the smallest amount of new square meters built.

- In this scenario, the number of human lives lost is smaller than in the baseline scenario but larger than in Option 3 as the growth of the new housing stock is slower and, therefore, people move more slowly from "fire-unsafe" buildings to "fire-safe" ones.

Costs for the judiciary system relative to bad design are assumed to go to zero.

Earthquake costs:

- Earthquake damages are the lowest in this scenario for the same reasons as direct fire losses are.
- For the same reasons, human lives lost are smaller here than in the baseline scenario but higher than in Option 3.

Public costs: this alternative, like Option 3 does require an upfront contribution from the public budget that later may be recovered through fees. In case of accidents (fires, earthquakes), this alternative implies less costs than in the baseline scenario. These costs are included in the previous items.

[20] In the standard scenario we assume 40% test takers passing the exam, against 50% for option 3

Benefits (not included in the final calculations)

Revenues: VAT and property taxes that accrue to the public budget in our standard growth scenario and in the low growth scenario are the highest under this option. In the high growth scenario public revenues are lowest for this option

Environmental benefits: the better design of buildings leads to a lower consumption of energy and, potentially, a less damaging impact on the environment. The positive effect is expected to be lower (and to appear more slowly) than in Option 3 as people move more slowly to better built buildings. These benefits, however, are not quantified.

OPTION 3: CERTIFICATION ADMINISTERED JOINTLY BY PROFESSIONAL ASSOCIATION AND THE GOVERNMENT

This option is the one in which the number of square meters produced reduces the least (with respect to the baseline scenario) after the transition period due to the assumption that the joint management of the exam procedures will ensure the access to the market to all qualified building designers. This is reflected in a higher increase in the number of professionals with respect to Option 2, given the same salary increase.

Costs

Market for building designers

In this scenario there is no more social loss due to asymmetric information, nor any deadweight loss due to the exclusion of qualified building designers.

Certification costs

Option 3 (like Option 2) requires to organize exams, administer them and to take care of data storage, assuring registry data are constantly safe and available to all the interested parties. The costs associated with certification have already been discussed in Option 2.

Exam costs are the lowest in Option 2, starting from the end of the transition period. In this scenario all qualified candidates would pass the exam. In the standard scenario it is assumed that 50% test takers passing the exam, against 40% for Option 2.

All the assumptions relative to certification costs are explained in greater detail in Annex D.

Other costs

Fire costs:

- Direct fire losses in this scenario are lower than in the baseline scenario but slightly higher than in Option 2 because the number of new square meters constructed decreases less with respect to the baseline.
- In this scenario, the number of human lives lost is the smallest as people move faster from “fire-unsafe” buildings to “fire-safe” ones (there are more new buildings).

Costs for the judiciary system relative to bad design are assumed to go to zero.

Earthquake costs:

- As with direct fire losses (and for the same reasons) earthquake damages are lower than in the baseline scenario but higher than under Option 2.
- For the same reasons, human lives lost are smaller here than in any other scenario.

Public costs: this alternative, like Option 2 does require an upfront contribution from the public budget that later may be recovered through fees. Costs are a bit higher as, after the transition period, public officials will continue participating in the certification process. In case of accidents (fires, earthquakes), this alternative implies less costs than in the baseline scenario. These costs are included in the previous items.

Benefits (not included in the final calculations)

Revenues: VAT and property taxes that accrue to the public budget in our standard growth scenario and in the low growth scenario are higher than in the baseline scenario but lower than under Option 2. In the high growth scenario, public revenues are lower than in the baseline scenario but higher than those under Option 2.

Environmental benefits: the better design of buildings leads to a lower consumption of energy and, potentially, a less damaging impact on the environment. The positive effect is expected to be faster than in Option 2 as people have a faster access to better built buildings. These benefits, however, are not quantified.

D. SUMMARY

Costs and benefits of Options 2 and 3 (relative to the status quo) are represented in Table 10 below. Among the benefits we have lower human losses from fires, together with lower fire and earthquake material losses and judiciary costs. As it was not possible to estimate directly the costs associated with the asymmetric information in the market for building designers, nor the human losses associated with earthquakes, the numbers in Table 10 underestimate the potential gains from the certification.

The NPV of benefits are positive and significantly large for both alternatives to the status quo. Comparing them, we see that the NPV of Option 3 exceeds that of Option 2 by about 10% in our base case scenario. This is due to the fact that, under our assumptions Option 3 has both higher benefits and lower costs than Option 2.

On the benefits side, due to the assumption that barriers to entry in the market for building designers are going to be lower when government officials participate actively in the certification process, the number of newly certified building designers is expected to increase faster in Option 3. This, on one hand, eliminates the deadweight loss in the market for building designers and, on the other hand, allows for a faster reduction in human losses caused by fires and earthquakes[21].

On the cost side, the assumption that barriers to entry cause a higher rate of failures during the exam causes an increase in overall exam costs in order to achieve the number of certified building designers to satisfy the market demand.

There are also a number of other non-quantified impacts that are relevant for our analysis. Among them:

- human lives potentially saved in case of earthquakes;
- potential reduction in environmental costs;
- gains associated with the development of an insurance market for building designers;
- better perception of the Georgian housing market among domestic and foreign investors;
- increased visibility of local professionals and construction companies at the international level.

While all of these impacts are expected from the adoption of both alternatives to the status quo, the extent of the impact are expected to vary. Namely, Option 3 is expected to lead to larger gains in terms of number of lives saved in case of earthquake and to better environmental outcomes.

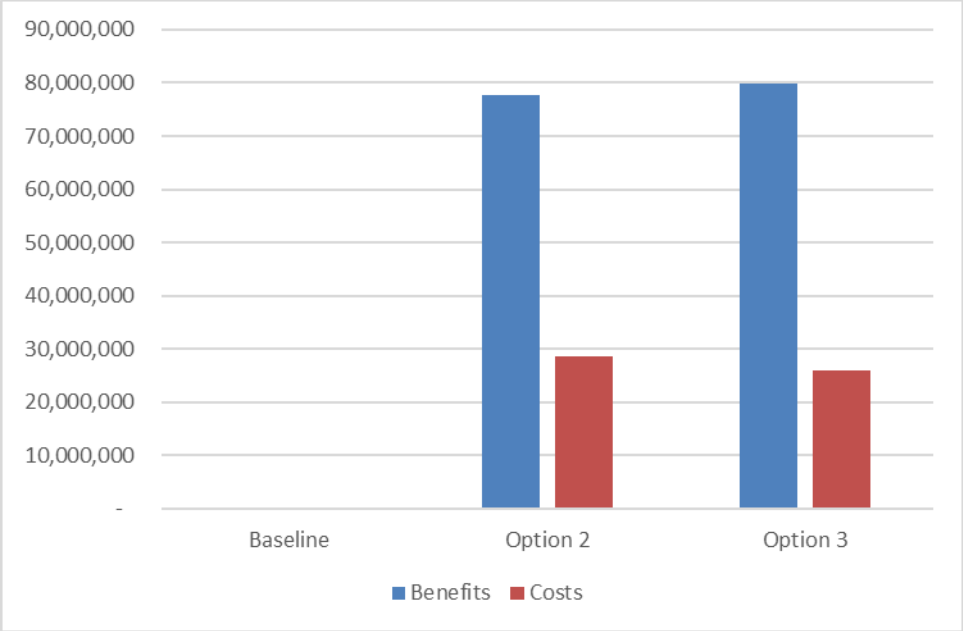
[21] Human losses from earthquakes are not quantified and, therefore, not monetized due to the high uncertainty.

Table 10. Summary of costs and benefits (relative to the status quo)

	OPTION 1	OPTION 2	OPTION 3
Benefits (NPV)	-	77,680,007 GEL	79,850,527 GEL
Costs (NPV)	-	28,643,165 GEL	25,980,848 GEL
Benefits – Costs (NPV)	-	49,036,842 GEL	53,869,679 GEL
Qualitative impacts	Highest expected number of deaths in case of earthquakes. Highest expected environmental costs. No risk of bottlenecks in the market for building designers hampering the development of the construction sector.	Expected number of deaths in case of earthquakes lower than in baseline but higher than in option 3. Expected environmental costs lower than in the baseline but higher than in option 3. Potential development of an insurance market for building designers. Better perception of the Georgian housing market (possibility to attract more investment) among domestic and foreign investors. Increased visibility of local professionals and construction companies at the international level. Highest risk of bottlenecks in the market for building designers hampering the development of the construction sector.	Lowest expected number of deaths in case of earthquakes. Lowest expected environmental costs Potential development of an insurance market for building designers. Better perception of the Georgian housing market (possibility to attract more investment) among domestic and foreign investors. Increased visibility of local professionals and construction companies at the international level. Lowest risk of bottlenecks in the market for building designers hampering the development of the construction sector.

Figure 5 demonstrates monetized impacts. Even without including the qualitative elements, benefits are lower and costs are higher in Option 2 with respect to Option 3.

Figure 5. Comparison of discounted costs and benefits of policy options (GEL)

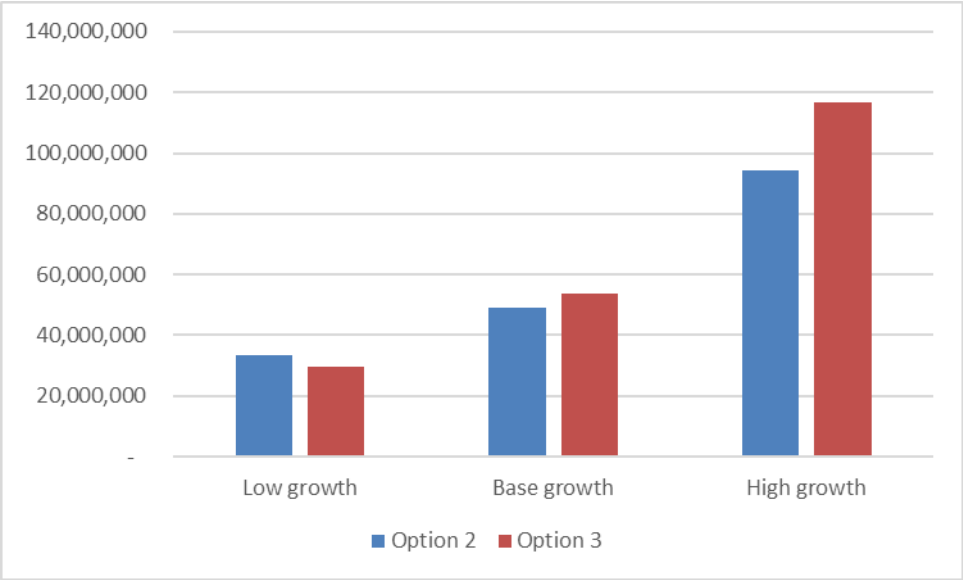


We checked the robustness of our results with respect to many different scenarios (high and low growth of the construction sector, different elasticities of demand and supply in the market for building designers and in the construction sector, different discount rates, different intensity of earthquakes, high and low VSL, etc.). In all cases, the NPVs remain positive for both options, with the difference between Option 2 and Option 3 widening as the expected growth of the construction sector increases, as it can be seen in Figure 6 below.

When the construction sector grows more slowly the number of lives potentially saved does not differ significantly across the two options. The potential increase in material losses associated with Option 3 (where the number of square meters built is higher) is therefore sufficient to tilt the balance in favor of Option 2. However, when the growth of the sector is sufficiently fast, the first effect dominates the second and makes Option 3 preferable. It is important to emphasize that this result is due to our assumption that old buildings are not destroyed immediately once new ones are being built. In such case, Option 3 would always dominate Option 2.

Another important element that should be considered (and potential impact of which was not monetized) is the risk that the introduction of a certification system leads to the emergence of bottlenecks in the market for building designers and, as a consequence, to frictions in the construction market. This risk is obviously higher, the higher the expected growth of the construction sector and the higher the barriers to entry to new building designers in the market. This strengthens our conclusion that the desirability of Option 3 with respect to Option 2 increases as the expected growth in the construction sector increases.

Figure 6. Comparison of expected net gains with respect to baseline scenario (NPV, GEL)


140,000,000
120,000,000
100,000,000
80,000,000
60,000,000
40,000,000
20,000,000
-
Low growth
Base growth
High growth
Option 2
Option 3

VII. COMPARING THE OPTIONS

While comparing the alternatives to identify the preferred one we considered a number of criteria in addition to NPV. These criteria are:

- Effectiveness: the capability of producing the desired results. In our case, the capability of assuring:

    1. increased safety of newly build buildings (expulsion from the market of non qualified building designers and monitoring of the activity of certified building designers);
    2. reduced uncertainty in the market for professional building designers and in the construction / real estate markets (institution of a nationwide, fair and reliable certification process allowing the development of an insurance market for building designers);
    3. increased international competitiveness of Georgian professionals and business companies operating in the construction sector (institution of a nationwide, fair and reliable certification process facilitating the participation of Georgian professional and business companies operating in the construction sector to international competitions).

- Feasibility: possible to realize.

- Minimization of risks associated with the reform: the capacity of the option to minimize undesired negative impacts of the reform not monetized in the CBA. This category includes the risk of the emergence of bottlenecks in the construction market due to the scarcity of building designers and the risk of certified building designers still designing unsafe buildings. The first one is a very serious risk, as about 7,000 building designers will have to receive their certification during the first two years in order to avoid a substantial reduction in the number of building designers in the market. The costs (and the risk of bottlenecks arising) will depend obviously on the percentage of building designers capable of passing the exam. We assumed the percentage of individual passing in the transition period will be between 50% and 75%. This means that about 13,000 candidates will have to take the test over the first two years. Should the percentage turn out to be lower, the number of test takers should increase accordingly. The main challenge of the government is to make sure this happens. After the transition period, the main challenge for the government will be to make sure that the system in place ensures both the expulsion of the non-qualified building designers and the certification of all the qualified building designers (no barriers to entry arising).

- Maximization of collateral benefits associated with the reform: the capacity of the option to maximize positive impacts from the reform not monetized in the CBA. All the positive externalities (and the reduction in the negative ones) generated by the reform and not monetized in the CBA are included, among them, lower environmental costs and less deaths associated with earthquakes.

A. SUMMARY OF OPTIONS

As it can be observed from Table 11, the baseline scenario is inferior to the introduction of a certification system according to almost all criteria. The only exceptions are the feasibility criterion (it is easier to do nothing than to introduce the certification system) and the minimization of the risk of bottlenecks.

Table 11. Comparison of options using multi-criteria analysis

EVALUATION CRITERIA	OPTION 1	OPTION 2	OPTION 3
Benefits – costs (NPV)	-	49,036,842 GEL	53,869,679 GEL
Effectiveness	- - -	++	+++
Feasibility / Ease to comply	+++	++	++
Minimization of risks associated with the reform	-	-	++
Maximization of collateral benefits associated with the reform	- - -	++	+++
SUMMARY	**- -**	**++**	**+++**

B. PREFERRED OPTION

Ranking of options

According to the analysis, the three options should be ranked as follows:

1. Option 3: certification system jointly managed by professional associations and government officials
2. Option 2: certification system managed by professional associations
3. Option 1: status quo

Motivation

Option 3 appears as the best way to both meet the objectives of the reform, to minimize the risks associated with it and to maximize its positive (and substantial) indirect effects.

The objectives of the reform will be met if the certification system will manage to expel the non-qualified building designers as well as the certified building designers failing to design safe buildings.

Option 2, while as effective as Option 3 in expelling the non-qualified building designers, is potentially less effective in "disciplining" the certified building designers. The cause of such concern is to be found in the incentive for professional associations to limit the access to the profession and to protect insiders (already certified) from negative publicity and severe sanctions. This could result in some cases in a lower than desirable safety of buildings and, ultimately, in a loss of confidence in the value of the certification, increasing again the uncertainty in the market for professional building designers and potentially damaging the international competitiveness of Georgian professionals and business companies operating in the construction sector.

In Option 3 the government takes an active role in making sure the certification process proceeds smoothly and there is no barrier to entry of new qualified building designers as far as the certification exam is concerned. By doing so the government minimizes the risk of bottlenecks in the market for building designers and, indirectly, in the construction market. At the same time the government makes sure the replacement of the old and unsafe housing stock proceeds as fast as possible, minimizing deaths and costs of fires and earthquakes together with other health and environmental damages. In Option 3 government active participation ensures also that regulations are enforced fully and irregular behaviors are sanctioned properly, protecting in this way the credibility and the effectiveness of the certification.

In order to mitigate the risks highlighted in the analysis of the options, the following actions are suggested:

- In order to minimize the risk of bottlenecks it is important to make sure that in the first two years as many as possible building designers take the exam. The government should design incentives to encourage taking the exam. It would be advisable, however, to maintain some sort of co-payment to reduce the likelihood that a large number of test takers come without preparing properly. It would certainly be crucial to make sure the building designers receive a clear message about the consequences of not passing the exam (being banned from designing after the transition period is over).

- Even with all these precautions it might turn out to be impossible to ensure there are no bottlenecks. A solution worth considering is the introduction (like it happens in several parts of the world) of a "modular" certification, with less strict requirements for designers of lower-risk building classes and stricter requirements as the risk class of the buildings increase.

- Scheduling a periodical training of government representatives and the committee members managing the certification system together with representatives of the businesses operating in the construction sector in order to avoid reduction of

flexibility of the system and its capacity to adapt to the needs of a continuously changing environment;

- Ensuring the periodic rotation of the government representatives, to minimize the risk of “capture”;
- Scheduling periodical revisions of the exam procedures and content.

In general, it is also suggested to monitor consistently the evolution of a number of relevant indicators associated with the effectiveness of the reform. They are described in the next chapter.

VIII. MONITORING AND EVALUATION PLAN

This part is kept to the minimum, as this is a pilot RIA. Nevertheless, it was decided to suggest a number of indicators that could be identified and a variety of data that could be collected in order to make easier the monitoring of the evolution of the safety of buildings and the success (or failure) of the reform introduced.

Table 12.Indicators of progress towards meeting the objectives

INDICATOR	FREQUENCY OF EVALUATION	RESPONSIBILITY FOR MONITORING
Number of structural fires	Yearly	Emergency response center 112
Number of people dead in structural fires	Yearly	Emergency response center 112
Number of people injured in structural fires	Yearly	Emergency response center 112
Number of court cases related to design problems	Yearly	Supreme Court of Georgia
Number of exam takers and their personal characteristics (including education, experience, training and professional courses)	At all exams	MoESD and Exam commission
Number of certified architects and civil engineers	New online database	MoESD
Number of graduates and enrolled students of Architecture / Civil Engineering	Yearly	MoES

Building stock in square meters by type (commercial, residential, etc), geographic distribution, age, quality, sustainability	Annual	Random inspection by building designer associations together with local and / or central governmental bodies of a fixed percentage of the designs of new buildings constructed in a given year (focusing mostly on the higher risk level ones).

REFERENCES

1. Bargain O., Orsini K., Peichl A. (2012).*Comparing Labor Supply Elasticities in Europe and the US: New Results*. IZA DP No. 6735.

2. Boardman, A. E., Greenberg D.H., Vining A. R., and Weimer D.L. (2006). C*ost-Benefit Analysis: Concepts and Practice*. 3rd ed., (Upper Saddle River, NJ: Pearson Prentice Hall).

3. Chelidze, T., et. al. (1999). *Seismic hazard assessment of Georgia (probabilistic approach)*. Institute of Geophysics.

4. Doucouliagos H., Stanley T.D., Viscusic W. K. (2014). *Publication selection and the income elasticity of the value of a statistical life*. Journal of Health Economics, 33 (2014) 67– 75.

5. Giergiczny M. (2008) *Value of statistical life – the Case of Poland*. Environmental and Resource Economics, 41:pp. 209-221. DOI: 10.1007/s10640-007-9188-2.

6. Hanushek E. A., Quigley J. M. (1980). *What is the price Elasticity of Housing Demand?* The Review of Economic Statistics, Volume 62, Issue 3.

7. Mayo S. K. *Theory and Estimation in the Economics of Housing Demand*. (1981) Journal of Urban Economics 10.

8. Medvedev, S.W., Sponheuer, W., and V. Karnik. (1965). *Seismic Intensity Scale Version MSK 1964*. UNESCO, Paris.

9. National Statistics Office of Georgia. (2009, 2010, 2011, 2012, 2014). *Statistical yearbooks*. Available at: http://geostat.ge/index.php?action=wnews_archive1&qy=1&qy1=16&lang=geo

10. The Geneva Association. (2014). *The World Fire Statistics 2014*. No. 29.

11. The International Bank for Reconstruction and Development / The World Bank. (2013). *Doing Business 2014 Economy Profile: Georgia*.

12. The World Bank Group (2013). *Good Practices for Construction Regulation and Enforcement Reform. Guidelines for Reformers.*

ANNEXES

ANNEX A: Assumptions for fire costs

Assumptions:

Our estimates on fire losses are based on the annual report of leading international think tank of the insurance industry, The Geneva Association, about the World Fire Statistics and all existing data sources in Georgia. In their report Geneva Association's staff are using data from the United Nations Economic Commission for Europe Committee on Housing and Land Management. Data cover mainly the years 2008-2010 and include national fire costs in around 20 countries. These data, despite their limitations, are the most comprehensive statistics available on national fire costs in the international context.

Costs of Direct Fire Losses

Direct fire losses are the cost of repairing fire damage - does not include costs such as lost business, housing relocation costs, psychological cost of loss of photographs, antiques, heirlooms, etc. In addition they exclude explosion losses where no fire occurs, e.g. some acts of terrorism. Please see the data below:

Table 13. Adjusted figures for direct fire losses and as an average percentage of GDP (millions, except for Japan - billions)

		Direct Losses			Percentage of GDP	
Country	**Currency**	**2008**	**2009**	**2010**	**2008-2010**	
Hungary	Ft		580	210	0.02	[2009-2010]
Singapore	$S	110	115	115	0.04	
Slovenia	SIT				0.07	[2002-2004]
Australia	$AUS	1,000	955	940	0.07	
Czech Republic	Kč	3,700	2,450	2,200	0.07	
Spain	€	910			0.08	[2008]
Poland	zl	1,450	1,150		0.09	[2007-2009]

		Direct Losses			Percentage of GDP	
Country	**Currency**	**2008**	**2009**	**2010**	**2008-2010**	
United States	$US	17,500	14,000	13,000	0.1	
Japan	¥	615	610	565	0.12	
New Zealand	$NZ	240		210	0.12	
Germany	€	2,850	2,950	2,700	0.12	
United Kingdom	£	1,950	1,750	1,750	0.13	
Netherlands	€	1,050	925	675	0.15	
Finland	€	305	280	330	0.17	
Sweden	kr	5,950	5,550	5,650	0.18	
Denmark	kr				0.2	[2005-2007]
France	€	4,550			0.2	
Italy	€	3,150	3,750	2,600	0.2	
Norway	kr				0.22	[2003-2005]

Source: Geneva Association. World Fire Statistics 2014.

For Georgia we have the following numbers:

Table 14. Number of fires and damage

	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Number of fires during the year	4418	5086	4818	7882	6488	7984	5796	9060*	8160*	9969*	7838

Damage, mln GEL	5.2	6.9	3.8	2.9	4.7	5.9	N/A	N/A	N/A	N/A	N/A

Source: 2003-2008 data is from GeoStat; 2009, 2010 and 2011 data about 2013 data are from Georgian Ministry of Internal Affairs, Legal Entity of Public Law – "112".

**Data include also cases of ignition.*

In order to come up with relevant direct fire loss estimates, we used lower and higher bounds for GDP figures to come up with share of fire damages in different years and we took lowest and highest shares as estimates for lower and higher bounds. We got the following results.

Table 15. Direct fire losses and as average percentage of GDP

2003	2004	2005	2006	2007	2008
0.00061	**0.0007**	0.00033	**0.00021**	0.00028	0.00031

We choose 2004 and 2007 shares, 0.07% and 0.021% as direct fire loss costs for not well designed buildings and well-designed buildings, respectively. For calculations we used GDP figures available from GeoStat, combined with estimated square meters of both type of building stock across years and different policy options. All estimates are in real terms and in 2013 prices. Direct fire losses per square meter, for well design have been estimated to be 0.05 GEL and direct fire losses per square meter, for poorly design building have been estimate to be 0.17 GEL.

Our results were comparable with other countries.

Fire Death Rates

Geneva Association's annual report about the World Fire Statistics, gives good insight where Georgia stands with regard to death rates caused by fires. Situation in Georgia was improving during the last decade. In 2009-2010 fire death rate on average was 1.56 compared to 4.12 in 2004. Georgian death rates are comparable with Western Europe figures.

Table 16. Fire deaths per 100,000 population (three-year averages)

Country	2002-2004	2005-2007	2008-2010
Albania	0.85		
Armenia	0.75 [2002-2003]	0.13 [2006]	0.55
Azerbaijan	5.93	0.42 [2007]	

Country	2002-2004	2005-2007	2008-2010
Belarus	8.92 [2002-2003]	8.79 [2007]	6.85 [2008-2009]
Bulgaria	1.78	1.92	1.72
Croatia	1.39	1.34	1.07
Czech Republic	0.78	0.73	0.67
Estonia	13.75	12.73	7.32
Georgia	4.12 [2004]	2.87	1.56 [2009-2010]
Hungary	2.26	2.05	1.89
Kazakhstan	4.08	3.75	3.01
Kyrgyzstan	1.93	1.79	1.57
Latvia	11.98	11.81	7.94
Lithuania	5.13	5.94	3.95
Macedonia, FYR	0.48 [2002-2003]	0.78 [2006-2007]	0.63
Moldova, Rep. of	3.6	5.8	5.32
Poland	1.41	1.86	1.82
Romania	2.39	2.31	2.21
Russian Federation	10.77	9.72	8.21
Serbia	0.75 [2002,2004]	1.13	1.03
Slovakia	0.95	1.18 [2005]	0.86

Country	2002-2004	2005-2007	2008-2010
Slovenia	0.59	0.6	0.61
Tajikistan	3.23	2.79 [2005]	
Ukraine	6.26	7.04 [2005-2006]	5.74
Uzbekistan	2.39	1.71 [2005]	

Source: Geneva Association. World Fire Statistics 2014

We estimate human costs of fire using 2009-2010 fire death rate and VSL for different quality of building stock and for different policy options.

Human death rates: because human death rates differ for well designed and not properly designed buildings, we have taken two values. We assume that death rate per 100,000 population living in good quality buildings is 1.56 (which is average number for Georgia based on Geneva Association report for 2009-2010, before the effects of the last reform of the Code could start to be felt) and for low quality buildings is 3.07 (which is average fire deaths per 100,000 population for countries in Eastern, Central and South Eastern Europe and Central Asia for 2008-2010. (Geneva Association,2014).). As the share of well designed buildings increases, the overall losses per square meter decrease.

VSL: Unfortunately there is no research done in this regard in Georgia yet, so we do not have estimates of VSL for the country. That is why we had to rely on research done in countries similar to Georgia and we decided to choose form Eastern European countries. 2012 Study done by OECD, "The Value of Statistical Life: a Meta-Analysis", presents a number of meta-analyses of the value of a statistical life in stated preferences surveys, and is an input to a technical report and a user's guide for policy makers on the use of VSL values in policy. Based on the data presented in the paper we had several options to choose from, and we decided that most appropriate was to use VSL estimated for Poland (Giergiczny, 2008). Average VSL estimated by the author is 795 082 US dollar in 2005 prices. We have converted 2005 US dollar to 2013 values. Converting numbers to GEL we get that average VSL in 2013 was 1 532 398 GEL (in 2013 prices)[22].

State costs of judiciary system

State budget expenditure per case for common courts: While calculating state costs of judiciary system we assume that cases will arise only for not well designed new buildings. To

[22] We tested the robustness of our assumption using the method suggested by Boardman (2006), taking USA and Poland as reference point and estimating the expected VSL for Georgia using the income elasticity of the VSL from Doucouliagos H., Stanley T.D., Viscusic W. K. (2014) to account for differences in income. The results we obtained were fully compatible with our assumption.

come up with the total state budget expenditure per case for common courts we used total state budget expenditure common courts (GEL) and total number of filed cases (civil, administrative and criminal ones).

Construction cases per 100,000 square meters not well designed: we have used 2013 data about total number of construction cases in the Common Courts across Georgia, stock of square meters of not well-designed buildings for the same year to calculate construction cases per 100,000 sqm not well designed buildings (5.85).

Estimated state costs of judiciary system: here we assume that construction cases per square meters not well-designed buildings will be the same in future as in 2013 and multiplied by the number of construction cases based on estimated flow of not well-designed buildings by average state budget expenditures (588 GEL).

Comment: 1. We are underestimating state budget expenditures because we possess information only about total number of construction cases in common courts only, the Supreme Court cases are ignored. 2. We do not possess information what were the reasons of cases, whether they related to design problems or not, so we are overestimating total costs in this regard.

ANNEX B: Earthquake costs

Assumptions:

1. Three earthquake zones: Tbilisi, Adjara and the rest of Georgia.
2. Probability distribution of intensities for Tbilisi and the Rest of Georgia is the same.
3. Expected costs of earthquake of intensity VI (MSK scale) is negligible for Tbilisi and the rest of Georgia.
4. Probability of earthquake of intensity more than VIII (MSK scale) is negligible for Adjara.
5. Annual probabilities were assumed to be interval probabilities over next 50 years divided by 50.
6. As probabilities are given for interval intensities, we take the “average” effect of the interval.
7. Share of each location’s building stock is the same as share of location’s population in 2013.
8. Share of bad buildings in the total stock (and automatically, share of good buildings in the total stock) is the same in all three locations and whole Georgia.
9. Half of bad buildings are buildings of type A (buildings in field stones, rural structures, adobe houses, clay houses) and another half – of type B (ordinary brick buildings, buildings of the large block and prefabricated type, half timbered structures, buildings in natural hewn stone). Good buildings are of type C (reinforced buildings, well-built wooden structures).
10. Damage grades are assumed to destroy a certain percentage of the value of the stock:

Grade 1 – 1%, Grade 2 – 20%, Grade 3 – 50%, Grade 4 – 75%, Grade 5 – 100%.

Calculation formula:

$$
\begin{aligned}
&\textit{Earthquake Cost in 2013 GEL for a given location, given intensity at time } t \\
&\quad = \textit{average cost per square meter for a given location} \\
&\quad * \textit{share of the building stock in the given location} \\
&\quad * \textit{probability of earthquake of intensity } i \textit{ for a given location at time } t * \frac{1}{2} \\
&\quad * (\textit{share of type A affected by earthquake of intensity } i \\
&\quad * \textit{extent to which type A building is affected by earthquake of intensity } i \\
&\quad + \textit{share of type B affected by earthquake of intensity } i \\
&\quad * \textit{extent to which type B building is affected by earthquake of intensity } i) \\
&\quad * \textit{square meters of } \boldsymbol{bad} \textit{ stock at time } t \textit{ for a given location} \\
&\quad + (\textit{share of type C affected by earthquake of intensity } i \\
&\quad * \textit{extent to which type C building is affected by earthquake of intensity } i) \\
&\quad * \textit{square meters of } \boldsymbol{good} \textit{ stock at time } t \textit{ for a given location})
\end{aligned}
$$

For each location:

1. Adjara
2. Tbilisi
3. The rest of Georgia

Each intensity:

- For Adjara $\boldsymbol{i = (6, 8]}$
- For Tbilisi and the rest of Georgia $\boldsymbol{i = (7, 9]}$

Add up all the costs for all intensities and for all locations for each year, $t = [2014 - 2029]$.

Table 17. Description of variables used for earthquake cost calculations

Variable	Description	Source
$Average\ cost\ per\ square\ meter\ for\ a\ given\ location$	$= \frac{\sum_{i=1}^{n} sellingprice_i}{\sum_{i=1}^{n} livingarea_i}$, where n is the number of households in a given location. Average costs are calculated separately for Tbilisi, Adjara and the rest of Georgia	Estimations are done base on GeoStat Household Survey 2012 data. Survey weights have been applied.
$Probability\ of\ earthquake\ of\ intensity\ i\ for\ a\ given\ location$ at time t	From 3 macroseismic intensity maps we deduced probabilities of certain intensity intervals happening in Tbilisi and Adjara. Probabilities are shown in Table 18.	Chelidze, T., et. al. (1999). *Seismic hazard assessment of Georgia (probabilistic approach).* Institute of Geophysics.
$Share\ and\ extent\ to\ which\ various\ types\ of\ buildings\ are\ affected\ by\ earthquake\ of\ intensity\ i$	Detailed information about share of buildings damaged is given in Table 19.	Medvedev, S.W., Sponheuer, W., and V. Karnik. (1965). *Seismic Intensity Scale Version MSK 1964. UNESCO,*

		Paris.
Good Stock and bad stock	Different for different years and different scenarios, based on assumptions of baseline and other two scenarios	Authors' calculations.

Table 18.Earthquake intensity probability distribution for selected locations

	Intensity Interval (MSK scale)	Probability of earthquake in next 50 years	Yearly probability of earthquake for next 50 years
Tbilisi	(7-8]	4%	0.08%
	(8, 9]	1%	0.02%
Adjara	(6-7]	3%	0.06%
	(7-8]	2%	0.04%

Source: Authors' calculations based on Chelidze, T., et. al. (1999). Seismic hazard assessment of Georgia (probabilistic approach). Institute of Geophysics, Tbilisi.

Table 19.Type of structure, number and classification of the damage to buildings

Intensity	Type of Structures					
	A		B		C	
	Share of the buildings affected	Damage grade	Share of the buildings affected	Damage grade	Share of the buildings affected	Damage grade
VI	Single (5%) Many (50%)	2 (20%) 1 (1%)	Single (5%) --	1 (1%) --	-- --	-- --
VII	Single (5%) Many (50%)	4 (75%) 3 (50%)	-- Many (50%)	-- 2 (20%)	-- Many (50%)	-- 1 (1%)
VIII	Single (5%)	5 (100%)	Single (5%)	4 (75%)	Single (5%)	3 (50%)

	Many (50%)	4 (75%)	Many (50%)	3 (50%)	Many (50%)	2 (20%)
IX	-- Many (50%)	-- 5 (100%)	Single (5%) Many (50%)	5 (100%) 4 (75%)	Single (5%) Many (50%)	4 (75%) 3 (50%)

Source: Medvedev, S.W., Sponheuer, W., and V. Karnik. (1965). Seismic Intensity Scale Version MSK 1964. UNESCO, Paris.

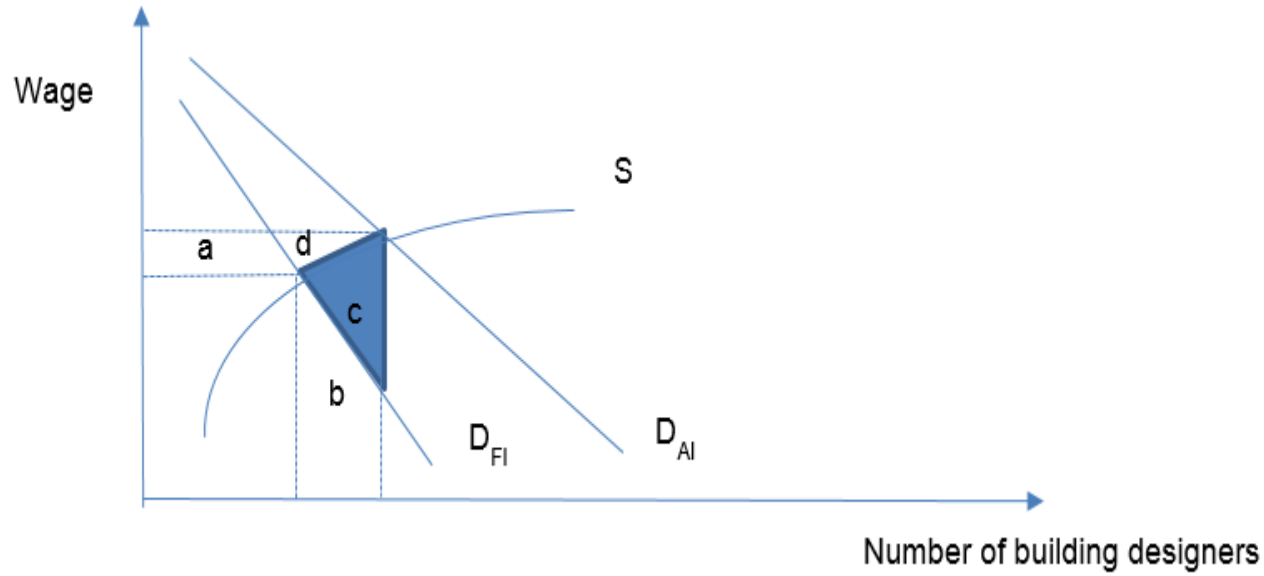
ANNEX C: Deadweight losses in the market for building designers

Deadweight loss before the certification

Demand for building designers' services is excessive, because of the asymmetric information. Customers receive a quality lower than they expect, for the price they pay. On the other hand, qualified building designers are forced to compete with less qualified designers that compresses their wages. The only ones gaining in this picture are the non-qualified building designers, who manage to sell their services. Unfortunately, their gains are more than compensated by the losses of the other two groups. This result, that cannot be easily quantified, remains nevertheless theoretically very solid and is shown in the figure 7 below.

D_{AI} is the demand by consumers caused by the existence of asymmetric information. D_{FI} is the demand they would show if they had full information. As a result of asymmetric information, consumers pay a+b+c+d more than they would pay otherwise. Building designers gain a+d. The consumers still get some benefit from the higher quantity consumed (area b). Overall, consumers are transferring a+d to the building designers and the amount c is lost in the process.

Figure 7. Deadweight Loss Before the Certification



Deadweight loss after the certification (option 2)

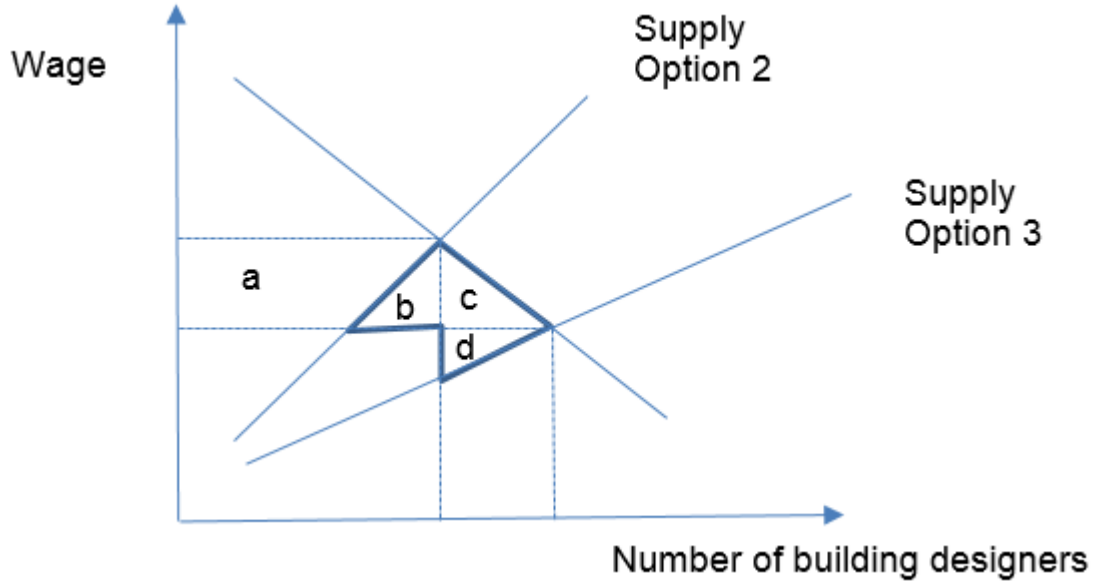
In this scenario there is no more a social loss due to asymmetric information. However, the potential restriction of the access to the profession operated by professional associations can cause a net loss of surplus. The exclusion of a part of the potential designers from the market causes:

- a loss for the excluded building designers equal to area d;

- a loss for the consumers (who pay higher wages and obtain less services) equal to area a+b+c;
- a gain for the building designers that get the certification equal to area a.

The total loss is given by area b+c+d.

Figure 8. Deadweight Loss from option 2



ANNEX D: Assumptions and monetary values for exam costs

Table 20. Assumptions and monetary values for exam costs

Exam Costs	Description
Computer costs	Computer cost in our calculation is 1100 GEL and it includes the cost of case (ALTA Core i5 3470-57113) and the cost of monitor Viewsonic. We assumed that the computer cost is fixed for 5 years. So, we need 100 computers every five years in order to ensure full operation of the exam center. Total cost for 100 computers in the first year is 110,000 GEL.
Consultancy fee	We assumed that in the first year of the exam there will be necessity of consultancy with foreign experts who have theoretical as well as empirical knowledge of the proper certification of Architects / Civil Engineers. This is one time cost of 60,000 GEL.
Question bank	We assumed that there will be 4,000 Question necessary for the first year. In order to calculated the cost of 4,000 questions we used the net hourly wage of full professor at GTU and time spent on preparation of one questions. Based on our experience at the university we assumed that 0.5 hours is necessary for one good question and average hourly wage of full professor at GTU net of taxes is 36 Gel according to the financial department of GTU. We further assumed that every year 5% question bank will be revised and 5% of the questions will be added.
Room rent	We assumed that the total cost for room rent depends of the flow of the applicants. We assumed that the exam will be held in the room with area of 150 square meters. Daily rent for room of 150 square meters is 1050 GEL. We assumed that 100 applicants will be test in one day.
Supervisors and managing staff	We assume that 15 people are necessary for supervising and managing exams. Average wage for supervising exams is 600 GEL per month. So, daily wage is 20 GEL. In order to ensure that they are objective and committed to their responsibilities we assumed daily wage of 30 GEL.
Checking exams	In order to calculate the cost for checking exams we used net hourly wage of full professor at GTU 36 GEL and based on the consultation with professors as well as the ministry we assumed that 2 hours are necessary to check one exam.
Opportunity cost	For calculation of the opportunity cost of applicant who pass the exam first time we took average salary of Architects / Civil Engineers who are employed in different sphere rather than construction. This is about 724 GEL. We took this salary constant every year because the opportunity cost each year is not the wage of Architects and Engineers in that year. People who take exams are not certified Architects / Civil Engineers and

	consequently, they will not be remunerated at the average of Architects / Civil Engineer that we calculated for specific year. However, for the applicants who had certificate and need to retake the exam because their certificate expired, as an opportunity cost we take the wage real equilibrium wage in for the year they are retaking the exam.
Other Costs	In addition we included other costs as 0.5% of the total cost for activities such as computer transportation, assemble, dissemble, and other miscellaneous costs.
Program cost and IT service	We did not incorporate this cost, because after consulting with the ministry ITs and software experts that are employed there will create the program and server at marginal cost of zero above their current remuneration.
Government official's wages	Based on the information from the MoESD we assumed that 2 government officials will be involved in the examination process for the whole 2 years in option 1 and for the whole period in case of option 2.

ANNEX E: The importance of the “design sector” from an international perspective

The importance of estabilishing a good-practice regulatory framework for the construction sector has been recently emphasized by the World Bank in its 2013 document “Good Practices for Construction Regulation and Enforcement Reform. Guidelines for Reformers.” According to the World Bank, a good regulation can help saving human lives while providing a fertile ground for business development.

Each country should build its own regulatory framework, modeled on the specific features of the country’s economy and society. The World Bank publication, however, makes an effort to identify the best practices currently adopted and to analyze the strenghts and weaknesses of the different options.

In all systems reviewed by the World Bank pratictioners play a key role. The implementation of the most modern form of risk-based management places a great emphasis on shifting “the risk, responsibility, and liability back to the design sector” in order to eliminate the potential bottlenecks due to the limited supervisory capacity of local authorities. Given the public interests at stake it becomes even more important that designers’ qualifications are thoroughly tested before they are allowed to operate. These tests can take place ex-ante or ex-post and be left to other private actors or to governmental bodies. In some cases private and public sectors compete. More often – like in the German case – the responsibility is shared, in order to limit the risk of “capture” while ensuring that the requirements for the profession keep matching the needs of a developing sector.

The case of Singapore

Singapore is a very interesting case study for countries aiming at developing an efficient building approval system which combines a smooth and quick decision process with the safety of new constructions. According to the Ease of Doing Business Index 2014, Singapore ranked third in the Construction Permits category, below Hong Kong SAR, China and Georgia.

What is interesting is what leads to this result. Singapore is not among the top ten looking at the numbers of procedures (11 vs. 6 for Hong Kong and 9 for Georgia) nor at the cost in percentage of income per capita (15.7% vs. 15.4% for Hong Kong and 14.9% for Georgia). However, when we look at the number of days needed to get a permit, Singapore takes the first position, with 26 days (vs. 71 for Honk Kong and 73.5 for Georgia). This impressive result can be understood only looking at the way in which che construction permits system has been organized.

In the early 1990’s the government Singapore launched an ambitious plan to use information technology (IT) to “create a competitive advantage, enhance productivity, and improve the overall quality of life in Singapore”. One of the 11 groups created to lead this task was the Construction and Real Estate Study Group, formed by private-sector pratictioners, professional associations and government agencies.

In 2001, Singapore launched the Construction and Real Estate Network (CORENET) building approval online platform. This online platform is behind the still unrivalled performance of the Singapore building approval system. Nowadays Singapore’s Building Control Department (BCD) accepts submissions only in electronic (standardized) formats.

This simplifies and quickens the screening process leading to the authorization, without affecting negatively the safety of the buildings.

Another key aspect of the reform was to give more responsabilities to building professionals (called “Qualified Professionals”), either certified engineers or certified architects. Building professionals are now sharing with BDC the responsibility to issue a reference number for a project. Therefore, building professionals have to be trained both to work with CORENET and, at the same time, to guarantee the highest safety construction standards.

This explains why, even in a highly technological and fast process like the one in Singapore, certification of professionals is taken very seriously.

Certification of engineers and architects in Singapore is the responsibility of two different bodies:

- the Board of Architects (BoA)
- the Professional Engineers Board (PEB)

Both bodies are composed in a way that maximizes the transparency and minimizes the risk of the Board being “captured” by the association it should govern.

Each Board includes:

- a commissioner from the Building Control Department
- 6 certified professionals elected by the professional associations;
- 6 certified professional appointed by the Minister;
- a certified professional from the other Board (an Engineer in the Board of Architect and an Architect in the Professional Engineer Board).

The implementation of the new system required a substantial public investment (including training to professionals before the online submission became compulsory and support for the acquisition of the necessary software and hardware). After thirteen years, however, the benefits associated with the investment are still evident.

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